

# PC MAGAZINE

INDUSTRY INSIGHT

**Jim Seymour  
Unravels the 1-2-3  
Upgrade Mess**

FIRST LOOKS

**Zenith's  
6-Pound  
MinisPort**



FIRST LOOKS

**1-2-3 Release 2.2  
Hands-on: Is It  
Worth It?**

FREE UTILITY

**DIRMATCH Speeds  
Disk Housekeeping**

VOLUME 8 NUMBER 16

THE INDEPENDENT GUIDE TO IBM-STANDARD PERSONAL COMPUTING

SEPTEMBER 26, 1989

## Where the Action Is

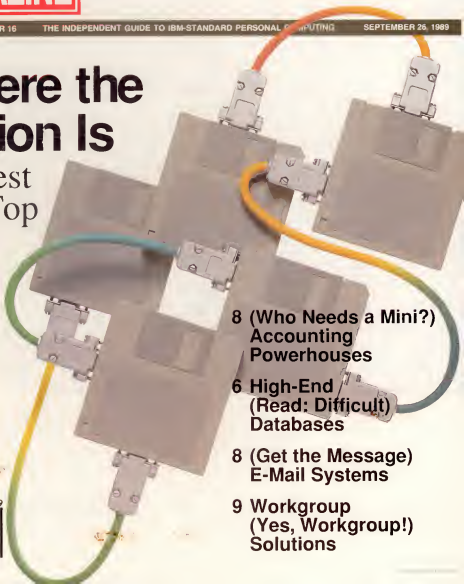
We Test  
The Top  
LAN  
Apps

**8 (Who Needs a Mini?)  
Accounting  
Powerhouses**

**6 High-End  
(Read: Difficult)  
Databases**

**8 (Get the Message)  
E-Mail Systems**

**9 Workgroup  
(Yes, Workgroup!)  
Solutions**



When  
1-2-3 users  
finally make the  
decision,  
they'll be amazed  
at what happens.

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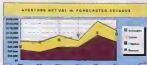
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
APRIL	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
MAY	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
JUN	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
JUL	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
AUG	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
SEP	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
OCT	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
NOV	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
DEC	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
YEAR	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



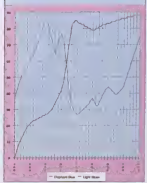
# APERTURE SALES

On Hand Sales

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
SALES	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
EXPENSES	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
PROFIT	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
NET	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



# GEN-FILTER CHART



# APERTURE 1000

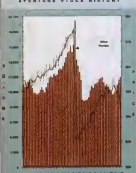
1. The Aperture 1000 is a...  
2. The Aperture 1000 is a...  
3. The Aperture 1000 is a...  
4. The Aperture 1000 is a...  
5. The Aperture 1000 is a...  
6. The Aperture 1000 is a...  
7. The Aperture 1000 is a...  
8. The Aperture 1000 is a...



# PURCHASE FORM

Form with fields for Name, Address, City, State, Zip, and a table for item details including Description, Quantity, and Price.

# APERTURE STOCK HISTORY



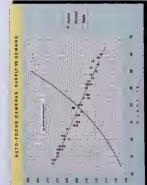
# SALES VOLUME & PROFIT MARGIN

Total Sales

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
SALES	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
EXPENSES	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
PROFIT	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
NET	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Planning

Notes on the history of Aperture Sales and Profit Margin, including a discussion of the factors influencing sales and profit.





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---

*PC MAGAZINE - May 16, 1989*

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*Unretouched photograph. Image created on the Samsung SyncMaster multi-scan color monitor.*

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*PC MAGAZINE—May 16, 1989*

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# Inside

By 1992 there will be more than 2.5 million local area networks (Mac- and PC-based) up and running around the world. That's an astounding 247 percent beyond the 719,000 that were installed by the end of 1988. Just what are all these LANs being used for? This special issue of *PC Magazine*, devoted exclusively to the subject of LAN application software, will help you find out.

Temporarily putting aside the hardware questions that have already been the subject of dozens of *PC Magazine* articles, we chose to take a close look at four applications that really shine on—or are meant exclusively for—networks: databases, accounting, electronic mail, and groupware.

Workgroup systems editor Frank J. Derfler, Jr., and LAN Labs project leader Randol Tigrett

were the congenial hosts as hordes of editors, project leaders, and writers invaded the normally tranquil *PC Magazine* LAN Labs in Destin, Florida to participate in the first serious LAN benchmark testing of accounting and database software ever attempted.

Adding to the excitement, we invited the software vendors to send technicians to help us load and program their packages for optimal network performance. Local airports must have noticed an increase in traffic as teams arrived from places as far away as Fargo, North Dakota; Sausalito, California; Findlay, Ohio; Vancouver, British Co-



lumbia; and Seattle, Washington, among other locales.

Delight and chagrin were the order of the day as these programmers watched their products fly or falter in testing. We would not be surprised to see future versions of the programs that directly reflect what these programmers learned at the LAN Labs. The testing process was truly synergistic; everyone walked away enlightened from it.

Price Waterhouse managers Ray August and Tim Lee, both of whom have wide experience with PC-based accounting systems, and both of whom developed a passion for Gulf Coast seafood, designed and supervised the testing of accounting packages (Lee had also helped organize *PC Magazine's* September 15,



Price Waterhouse representatives Ray August and Tim Lee went south to make sure our accounting tests didn't

1987, survey of 59 accounting packages).

West coast editor Lee Thé, a fervent accounting fan who also made the long trip to Florida, observed the rigorous benchmark testing process. His insights kick off our accounting software coverage.

PC Labs project leader Pamela Miland and staff writer Catherine Miller ran the database tests along with contributor Alfred Poor. All three came back with healthy tans—achieved, they insist, by sitting in front of five EGA screens 14 hours a day for 2 weeks.

—Donald P. Willmott

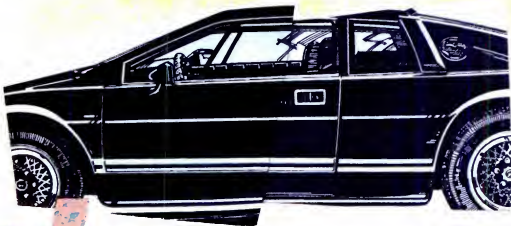
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November 1988

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## UP FRONT

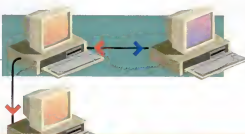
- 4 INSIDE**
- 15 LETTERS**
- 27 ADVISOR**  
*Lori Grunin/* Brushing up on math; swapping the Ctrl and CapsLock keys; checking your grammar.
- 33 FIRST LOOKS**  
*Lotus 1-2-3*, Release 2.2: A modest upgrade for 8088-based users.  
8-MHz 80C88-based *Zenith MinisPort*: A traveler's dream machine?  
*UltraScript PC* offers low-cost PostScript compatibility to non-PostScript printers.  
The best personal and small-business check writer gets better in *Quicken 3.0*.  
\$200 *Derive* provides high-end computer algebra features, challenging *Mathematica*.
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Why OS/2 is proceeding so slowly.
- 91 STEPHEN MANES**  
Quality crisis? What quality crisis?



## COVER STORY

- 96 BUILDING WORKGROUP SOLUTIONS**  
**LANs: The Software Is the Story**  
*Frank J. Derfler, Jr./* Once your local area network is installed and running, how will you put it to work? *PC Magazine* devotes this issue to the subject of LAN application software, focusing on four specific areas that take advantage of your LAN's multiuser capabilities.
- 105 DATABASES**  
**Multiuser Databases: The Art of Simultaneous Access**  
*Alfred Poor/* No matter how familiar you are with manipulating a program-mable relational database as a single user, running the software in a multiuser environment adds complexity. How well have *Clarion Professional Developer*, *DataEase*, *dBASE IV Developer's Edition*, *dBXL*, *Paradox*, and *R:BASE for DOS* been adapted for use on a LAN? *PC LAN Labs'* testing tells an interesting story of performance degradation under increased loads and the emergence of a clear performance leader.
- 110 Features Table**
- 116 Performance Tests**
- 157 ACCOUNTING SOFTWARE**  
**LAN Accounting Software: Up to Speed on the PC Platform**  
*Lee The! Price Waterhouse* experts perform the first serious benchmark tests of accounting software in a multiuser environment. Tested were *AccPac Plus*, *Data Pro Accounting Series*, *Great Plains Accounting Series*, *Macola*, *Platinum Series*, *RealWorld Accounting System*, *SBT Database Accounting Library*, and *Solomon III*.
- 178 Features Table**
- 212 Performance Tests**





## COVER STORY

### 247 WORKGROUP PRODUCTIVITY SOFTWARE

#### Imposing Efficiency: Workgroup Productivity Software

*Frank J. Derfler, Jr./* Groupware. Behind that nebulous buzzword are dozens of programs that enhance group productivity in any number of ways. *PC Magazine* focuses on nine packages that specialize in group scheduling and coordination. Each has the potential to do the job, but only if all of the users on the LAN do their jobs in supplying the necessary information.

### 252 Features Table

### 273 ELECTRONIC MAIL

#### LAN E-Mail: Spreading the Network News

*Frank J. Derfler, Jr./* What better use for your LAN than to make it the hub of a low-cost interoffice electronic-mail system? Use one of these eight packages and say good-bye to that stack of memos and missed messages.



### 285 Features Table

## PRODUCTIVITY

### 307 LAB NOTES

#### High-Speed Communications in DOS and OS/2

*Jeff Prosser/* Under DOS you need special programming techniques to implement interrupt-driven operation. In this issue we'll take a look at them.

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#### Update Your Directories with a Keystroke

*Michael J. Mefford/* Our DIRMATCH utility combines side-by-side directory comparisons with Mark/Copy/Move facilities for easy updating.

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### 432 Advertisers' Product Index

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## PRODUCTIVITY

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*Charles Petzold/* Microsoft's new, attractively priced Presentation Manager programming tools give you all that you need to learn OS/2 programming.

### 353 POWER PROGRAMMING

*Ray Duncan/* Part 1 of a series on programming the 80386 gives you an overview of this CPU's architecture and tells how to start using its capabilities.

### 367 USER-TO-USER

*Neil J. Rubenking/* Display all of the ANSI color combinations and choose the one that you like best; a better way to delete sensitive data from files; three useful batch files for moving files to and from your hard disk.

### 371 POWER USER

*Craig L. Stark/* An undocumented *dBASE III Plus* command will speed up your file processing; a macro that completely removes hyphens from a *WordPerfect* document.

### 377 LANGUAGES

*Tony Rizzo/* Tips on how to increase your performance while using Turbo Pascal; a Pascal function for creating Soundex-based codes; an easy method for determining what adapters are installed on a host PC.

### 383 TUTOR

*Tony Rizzo/* Detecting what type of video adapter is installed in a system; using *PUSHDIR* and *POPDIR* to manage subdirectories.

## AFTER HOURS

- 439 ■ *Mastering the LSAT*, for would-be law students.
- *Neurotics*: Mental exercises.
- *Life & Death* puts the scalpel in your hot little hand.
- *TKO*, for armchair Mike Tyson.

### 444 ABORT, RETRY, FAIL?

*Bill Howard*







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We use all the latest high-tech components. Memory Caching, Shadow RAM, Integrated I/Os and Fast Access Hard Drives, make our systems scream along. With the fastest RAM, the fastest Video and the fastest Hard Drive, you get a system that is a real winner! As *PC Magazine* said when they awarded

our Austin 286/12.5 the *Editor's Choice* in January,

1989, "Austin Computer Systems has a winning combination of classy parts, smart design, high performance, and aggressive

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January 1989  
Editor's Choice  
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#### Austin 286/16 Slim Line Standard Features Include:

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- 1 or 1.1 Transfer Controller Card • High-Speed Hard Disk Cache
- Your Choice of RAM: 2MB or 4MB RAM (expandable to 16MB total)
- Shadow RAM Caching (BIOS Caching) • EMS (UMM) 4 GB Support
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- Your Choice of Floppy Disk Drive: 3.5" 1.44MB or 5.14" 1.2MB
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- Click with Battery Backup • 80287 Math Co-Processor Socket
- American-Made Motherboard • Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program • Fully DOS 6.0/5.0 Compatible

Individual Revolving Credit Accounts start at \$66.00 per month \*\*  
Business Leases start at \$80.00 per month \*\*\*

Austin 286/16 Slim Line Price Matrix			
Choose Hard Drive	Monitor & Video Adapter Card	VGA Color	VGA Color
	Monochrome (640 x 480) (800 x 600)		
40 MB HD (28 ms 1:1)	\$2195	\$2395	\$2395
72 MB HD (28 ms 1:1)	\$2395	\$2595	\$2595
110 MB HD (15 ms 1:1)	\$2595	\$2795	\$2795



#### Austin 386/5X Standard Features Include:

- True Intel 80386 SX Processor • GE 1 Year On-Site Service
- Your Choice of Monitor: VGA Color, PRO VGA Color or TTL Monochrome
- 16-Bit VGA Display Adapter
- Your Choice of Hard Drive: 40MB, 72MB, 110MB, 160MB or 330MB
- 1 or 1.1 Transfer Controller Card • 6-16MB SMD and 2-8MB SMD
- Shadow RAM Caching (BIOS Caching) • EMS (UMM) 4 GB Support
- Your Choice of RAM: 2MB, 4MB or 6MB RAM (expandable to 16MB total)
- Your Choice of Floppy Disk Drive: 3.5" 1.44MB or 5.14" 1.2MB
- Enhanced 131 Keyboard • 80387 Math Co-Processor Socket
- Click with Battery Backup • 80387 Math Co-Processor Socket
- American-Made Motherboard • Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program • Fully DOS 6.0/5.0 Compatible

Individual Revolving Credit Accounts start at \$80.00 per month \*\*  
Business Leases start at \$73.00 per month \*\*\*

Austin 386/5X Price Matrix			
Choose Hard Drive	Monitor & Video Adapter Card	VGA Color	VGA Color
	Monochrome (640 x 480) (800 x 600)		
40 MB HD (28 ms 1:1)	\$1195	\$2495	\$2495
72 MB HD (28 ms 1:1)	\$2295	\$2795	\$2795
110 MB HD (15 ms 1:1)	\$2495	\$2995	\$2995
160 MB HD (15 ms 1:1)	\$2795	\$3295	\$3295



#### Austin 386/33 Cache Standard Features Include:

- True Intel 80386 Processor • Intel 32 MB 82385 Cache Controller
- Direct Max 32K Static RAM Cache • 20 Nanos
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- 55 2MB Performance Rating (Landmark) • GE 1 Year On-Site Service
- System RAM consists of Ultra High Performance 32-Bit Static Column RAM
- Your Choice of Monitor: VGA Color, PRO VGA Color or TTL Monochrome
- 16-Bit VGA Display Adapter
- Your Choice of Hard Drive: 40MB, 72MB, 110MB, 160MB or 330MB
- 1 or 1.1 Transfer Controller Card • Shadow RAM Caching (BIOS Caching)
- Your Choice of RAM: 2MB, 4MB or 6MB RAM (expandable to 16MB total)
- 1 or 1.1 High-Speed Memory Bank • 5-16 MB SMD and 2-8 MB SMD
- American-Made Motherboard • Fully DOS 6.0/5.0 Compatible
- Your Choice of Floppy Disk Drive: 3.5" 1.44MB or 5.14" 1.2MB
- Enhanced 131 Keyboard • 2 Serial Ports • 1 Parallel Port
- Click with Battery Backup • 80387 Math Co-Processor Socket

Individual Revolving Credit Accounts start at \$129.00 per month \*\*  
Business Leases start at \$156.00 per month \*\*\*

Austin 386/33 Cache Price Matrix			
Choose Hard Drive	Monitor & Video Adapter Card	VGA Color	VGA Color
	Monochrome (640 x 480) (800 x 600)		
40 MB HD (28 ms 1:1)	\$4295	\$4795	\$4795
72 MB HD (28 ms 1:1)	\$4495	\$4995	\$4995
110 MB HD (15 ms 1:1)	\$4695	\$5295	\$5295
160 MB HD (15 ms 1:1)	\$5095	\$5595	\$5595



#### Austin 286/12.5 Cache Standard Features Include:

- Intel 12.5 MHz 80286 Processor • GE 1 Year On-Site Service
- Your Choice of Monitor: VGA Color, EGA Color or TTL Monochrome
- 16-Bit Parallel VGA or EGA Advanced Display Adapter
- Your Choice of Hard Drive: 40MB, 72MB or 110MB
- 1 or 1.1 Transfer Controller Card • 22K High-Speed Hard Disk Cache
- Your Choice of RAM: 2MB or 4MB RAM (expandable to 16MB total)
- Shadow RAM Caching (BIOS Caching) • EMS (UMM) 4 GB Support
- Your Choice of Floppy Disk Drive: 3.5" 1.44MB or 5.14" 1.2MB
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- 2 Serial Ports • 1 Parallel Port • 1 PS/2 Mouse Port
- Click with Battery Backup • 80287 Math Co-Processor Socket
- American-Made Motherboard • Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program • Fully DOS 6.0/5.0 Compatible

Individual Revolving Credit Accounts start at \$51.00 per month \*\*  
Business Leases start at \$62.00 per month \*\*\*

Austin 286/12.5 Price Matrix			
Choose Hard Drive	Monitor & Video Adapter Card	VGA Color	VGA Color
	Monochrome (640 x 480) (800 x 600)		
40 MB HD (28 ms 1:1)	\$1895	\$1995	\$1995
72 MB HD (28 ms 1:1)	\$1995	\$2095	\$2095
110 MB HD (15 ms 1:1)	\$2095	\$2195	\$2195



#### Austin 386/20 Cache Standard Features Include:

- Intel 80386 20MHz Double Sigma Processor • GE 1 Year On-Site Service
- 4MB Static RAM Cache • 80385 • 30MB Performance Rating (Landmark)
- Your Choice of Monitor: VGA Color, PRO VGA Color or TTL Monochrome
- 16-Bit VGA Display Adapter
- Your Choice of Hard Drive: 40MB, 72MB, 110MB, 160MB or 330MB
- 1 or 1.1 Transfer Controller Card • 1-32MB 6-16MB 1-8MB SMD
- Your Choice of RAM: 2MB, 4MB or 6MB RAM (expandable to 16MB total)
- Your Choice of Floppy Disk Drive: 3.5" 1.44MB or 5.14" 1.2MB
- Enhanced 131 Keyboard • 80387 Math Co-Processor Socket
- Click with Battery Backup • 80387 Math Co-Processor Socket
- American-Made Motherboard • Users & Technical Reference Manual
- Built-in Setup & Diagnostics Program • Fully DOS 6.0/5.0 Compatible

Individual Revolving Credit Accounts start at \$75.00 per month \*\*  
Business Leases start at \$91.00 per month \*\*\*

Austin 386/20 Cache Price Matrix			
Choose Hard Drive	Monitor & Video Adapter Card	VGA Color	VGA Color
	Monochrome (640 x 480) (800 x 600)		
40 MB HD (28 ms 1:1)	\$2495	\$2995	\$2995
72 MB HD (28 ms 1:1)	\$2695	\$3295	\$3295
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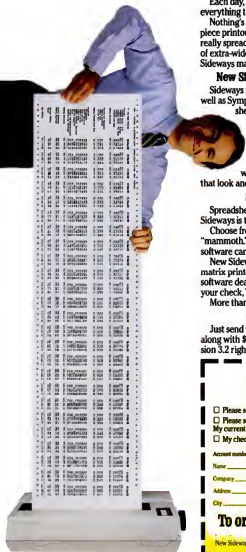
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# Letters

## THE NEW LOOK

Having thoroughly enjoyed your magazine in the past, I'm sorry to make my first letter to *PC Magazine* a negative one, but I just got my June 27, 1989, issue and had to give you my opinion of your new layout. Yawn! Now I know how Classic Coke drinkers felt when New Coke was introduced! The new layout is boring and bland, using washed-out colors and text that seems to fade into the page. Your advertisers are sure to love it, though, since your stories no longer draw attention away from their ads. Do us a favor and give us back our Classic *PC Magazine*.

Tom Hogan  
Monterey, California

I used to be one of your biggest fans until you screwed up the best computing magazine on the market. New isn't always better, and your June 27, 1989, issue is proof of that. The new format looks amateurish at best and trashy at worst. You have succeeded in making a first-rate magazine look second-rate.

Just to be fair, I'll bet there are many free-thinking individuals glad to see that you have changed your magazine. Your competition must love it!

Jim McGuire  
Orange Park, Florida

I just received my June 27, 1989, edition of *PC Magazine* and want to let you know how much I like the new look. The soft edges to headers and columns are a particularly nice touch. My congratulations to Gerard Kunkel and John Vogler for the design, and to Kunkel's staff for their fine efforts.

Daryl Martin  
Reisterstown, Maryland

When I received my current issue of *PC Magazine*, I was struck by the cover. The layout and graphics seemed old-fashioned and even amateurish. And when I opened the book—ugh! What possessed you to use those colors, those pictures? Who



PC Magazine readers had a lot to say about the recent redesign.

talked you into squeezing Dvorak and even Seymour into those ungainly "keyhole" boxes on their pages? They look like prisoners on the way to jail in the sheriff's bus.

It's your show, and I will admit that some of the pages and placements seem a little better. But overall, I wish you had stuck with your old look and perhaps refined it. One of my original reasons for subscribing to *PC Magazine* was that it looked better and was easier to read than its competitors.

Alan Stone  
Portland, Oregon

I just finished "installing" Version 3.0 of your magazine and have to say that I'm generally pleased with it. The changes to the table of contents and the After Hours section, which I thought was an error the first time it appeared, are to me the most welcome. On the down side, First Looks has become more intimidating, and I think you have established your own Five Most Wanted list with the new skinny pictures of Bill, John, Jim, William, and Stephen. They all look like they're up to no good!

Tim P. Johnson  
Sepulveda, California

A wise man once said, "If it ain't broke, don't fix it." I think you should heed these words next time you consider a restructuring of your format. Do us all a favor: stop trying to make *PC Magazine* a hotbed of yuppie ideology. If I want trendy layouts, I'll go read an article about Madonna in *People*!

Mike Fanning  
Tuscaloosa, Alabama

## BEST SUPPORTING VENDOR

Your recent survey on mail-order hard disks ("Fast, Easy, Risk-Free: Buying Hard Disks by Mail," *PC Magazine*, June 27, 1989) missed the mark in one important respect. Noting only the positive aspects of mail-order shopping and purchasing, you completely neglected to rate the vendors in terms of service, availability, and delays. Many of us have had nightmarish experiences with the very same companies you praised.

Paul Turvill  
Oak Harbor, Washington

*PC Magazine* devotes a lot of space to product reviews and technical advice, and does an excellent job. But unfortunately there are still a lot of software companies out there that think sales are far more important than support, or that the connection between the two is weak. Perhaps you should consider an issue devoted to service and support; it would definitely benefit your readers.

D. R. Aton  
Decatur, Georgia

## IN SEARCH OF ARTS & LETTERS

I feel your recent review of graphics packages ("Fine Lines: The PC as Illustrator," *PC Magazine*, June 27, 1989) was seriously flawed by its omission of Computer Support's *Arts & Letters Graphics Editor*. We have used this package for several years and are very pleased with it. The *Graphics Editor* enables us to produce highly polished customer documentation, presentation materials, and printed fliers. The usefulness of your head-to-head evaluations is weakened



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## Letters

when you miss a serious competitor, as you did in this evaluation. We feel that the *Arts & Letters Graphics Editor* should have been an Editor's Choice.

Jim Brown

Quail Ridge Automation

Westmont, Illinois

Sometimes I just don't understand you folks! In your recent feature on PC-based illustration packages ("Fine Lines: The PC as Illustrator"), you failed to review a very serious contender in this product category: Computer Support's *Arts & Letters Graphics Editor*. Granted, you do mention it in a sidebar under clip-art packages, but *Arts & Letters* is much more than just clip art. For anyone who works with presentation graphics, *Arts & Letters Graphics Editor* is a package that has no peer in the Mac or PC world.

Bill Bailey

Hockessin, Delaware



Be sure to look for an in-depth review of the *Arts & Letters Graphics Editor* package, which will be appearing in an upcoming issue of *PC Magazine*.—Ed.



## MADE IN THE USA?

I think John C. Dvorak's remarks on the emerging Japanese AX standard (*Inside Track*, *PC Magazine*, May 16, 1989) are almost right on the money, but he forgets that the Japanese do not need to import computers into the U.S. from Japan. For example, NEC could easily make AX-compatible machines using the same production lines used to make the PowerMate series of AT compatibles. So why bother importing the machines from Japan (with attendant shipping costs and a protectionist Congress to deal with) when most of the Japanese manufacturers can build them right here?

Raymond Chuang

Mountain View, California



## IN DEFENSE OF DAC

The Letters section of your June 27, 1989, issue contains a letter that is unfairly critical of the *DacEasy Accounting 3.0* package. We have been running the *DacEasy* program for more than 6 months on a 20-MHz 386 machine and have encountered no problems whatsoever. In fact, we have

nothing but praise for both the program and the excellent technical support—which has seldom been needed.

William S. Wright  
 Zurich, Switzerland

## WE MEANT TO STICK IT ON

This letter is in reply to Winn L. Rosch's recent review of the CTX 3435 ("Multiscanning Monitors for VGA and Beyond," *PC Magazine*, May 16, 1989). Our company was called by your magazine and told to rush a sample 3435 monitor to your staff for review in an upcoming issue. The 3435 at that time was still in preproduction stages, and we furnished *PC Magazine* with an engineering sample to help with the publishing deadline we were told had to be met.

Mr. Rosch was quite right in stating that the monitor had no FCC sticker. As this particular unit was a sample and not from

Why should the Japanese bother importing AX machines from Japan when most Japanese manufacturers can build the machines right here?

regular production, no sticker was affixed. Rest assured, however, that the model is covered by Class B FCC certification number DBL-7GMCC-3435 and that FCC stickers are in place on all monitors that are sold. The unit tested also lacked the shielding added to all production models, and it is this lack that accounted for the interference Mr. Rosch noted in his review.

Jim Stewart

CTX International Inc.  
 Walnut, California



The CTX International monitor submitted for review was not identified as a preproduction model, and when the company was queried in regard to some of the shortcomings of the



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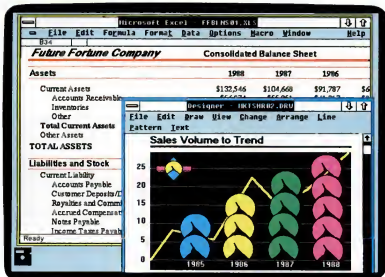
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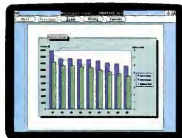
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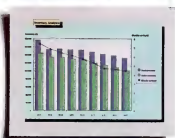
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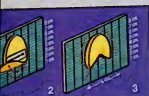
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e Fortune Teller

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...not really, the Fortune is the lower third of the dough, and slightly to the right of the center. The Fortune is the lower third of the dough, and slightly to the right of the center. The Fortune is the lower third of the dough, and slightly to the right of the center.

Fortunes for the month of August

- all find a reliable car partner.
- an important call on your car phone
- your surgery lifts spirits as well as wrinkles.
- you will never return from maternity leave.
- moment is a thing of the past. Invest in a car soon.
- interest in real estate will only lead to frustration.
- all prosper as will your accountant.
- no finances record nobody remembers.

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- Landmark v1.1 = 33.4 MHz
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14" VGA	\$ 4595	\$ 5131	\$ 5385	\$ 5931

Model 320 Hard Drive Capacity				
Video Combo	60MB ESDI	90MB ESDI	150MB ESDI	330MB ESDI
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14" EGA	\$ 2943	\$ 3289	\$ 3543	\$ 4089
14" VGA	\$ 2995	\$ 3331	\$ 3585	\$ 4031

Model 325 Hard Drive Capacity				
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14" EGA	\$ 3643	\$ 3989	\$ 4243	\$ 4789
14" VGA	\$ 3795	\$ 4131	\$ 4385	\$ 4931

Model 316 Hard Drive Capacity				
Video Combo	60MB ESDI	90MB ESDI	150MB ESDI	330MB ESDI
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## Letters

unit and its apparent lack of FCC certification, its preproduction status was not mentioned. After publication of the review, CTX submitted its model CTX 3435P for evaluation. While this unit corrected some of the problems observed in the first monitor received, it also rates only as an acceptable, and not an exemplary, display.—*Winn L. Rosch*

### TAKE BACK THE FAX

I am moved to comment on John C. Dvorak's call to fight laws that would make junk fax illegal (Inside Track, *PC Magazine*, June 13, 1989). As a business owner who depends upon open access to our fax for clients and vendors, I must strongly disagree. Anyone and anything unsolicited that ties up our fax is interfering with our ability to conduct business. Unlike telemarketers, whom we can hang up on, and junk mail, which we can throw away, a junk fax cannot be disconnected. And adding injury to insult, the senders of junk fax traffic don't reimburse us for our paper.

We strongly support a vigorous letter-writing campaign to federal legislators and the FCC supporting laws against unsolicited fax transmissions.

Daniel A. Morgan

Morgan, Tuninga, and Associates  
Mercer Island, Washington

### FILLING IN THE BLANKS

When *PC Magazine* first contacted Deerfield Systems at the end of 1988 about its upcoming feature on forms software ("Forms Software Fills In the Blanks," *PC Magazine*, June 13, 1989), we were concerned. Through previous experience, we were aware that its classification as a "forms product" tended to place our package, *DisplayForm II*, into the same category as forms-creation software. We hoped that PC Labs' extensive testing would help clear up the confusion between forms creation and forms processing. Unfortunately, this was not to be the case.

*DisplayForm II* is not meant to be a solution for those who wish to design forms. Omitted from your review were any references to the package's hooks to dBASE, FoxBASE, and Clipper via command-line calls; its full complement of DOS and database utilities; and its add-on DisplayFax option, which allows direct faxing from the screen using an internal fax board.

Anything unsolicited  
that ties up  
our fax is interfering  
with our ability  
to conduct business.  
As a business  
owner, I support laws  
against unsolicited  
fax transmissions.

We suggest that another look be taken at the forms market and that more questions be asked in the business environment. We look forward to a more definitive and directed review in the future.

John R. Muraca  
General Manager  
Deerfield Systems Inc.  
Utica, New York

### AND THE QUOTE BELONGS TO . . .

Following in the glorious footsteps of D. J. Jaffe (Letters, *PC Magazine*, June 27, 1989), let me be the first to announce that the 80586 chip is brain damaged. Many thanks.

Michael J. McIntyre  
Detroit, Michigan

### CORRECTIONS & AMPLIFICATIONS

Hard Drive International ("Fast, Easy, Risk-Free: Hard Disks by Mail," *PC Magazine*, June, 27, 1989) adds a 5 percent surcharge to American Express orders only, not to VISA and MasterCard orders. Order-processing time is 48 hours.

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— Computer Shopper, April 1989

Gracefully combining power and performance, this Swan has soared to the upper limits of today's technology.

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  - Shadow RAM for Video & BIOS
  - Memory Interleave for near 0 Wait State
  - 80287 & 80387 Co-processor Socket
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  - 5 Device Bays: 3 Exposed, 2 Internal
  - 1.2MB S.25<sup>™</sup> or 1.44MB 3.5" Floppy Drive
  - Dual Floppy/Dual H.D. Controller w/1:1 Interleave
  - Ports: 2 Serial, 1 Parallel
  - 8 Expansion Slots: 1) 32-bit, 4) 16-bit, 3) 8-bit
  - Enhanced 101 Key Keyboard
  - Clock Calendar w/Battery Backup
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- Options:**
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  - Upgrades: 2, 4, 8, 10 or 16MB
  - GW BASIC/MS-DOS add \$89

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Base System with Single Floppy, No Video

386/20D	VIDEO OPTIONS			
	Include Monitor & Video Adapter			
Drive Options	Mono	14" Flat Mono	VGA Color	VGA Color
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w/80MB (28ms) & 1:1 Interleave	\$2849	\$2898	\$3048	\$3348
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— Computer Shopper, April 1989

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- 1MB RAM Expands to 8MB on Systemboard
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- Memory Interleave for near 0 Wait State
- 80387SX Co-processor Socket
- 200W Power Supply
- 4 Device Bays: 3 Exposed, 1 Internal
- 1.2MB 5.25" or 1.44MB 3.5" Floppy Drive
- Dual Floppy/Dual H.D. Controller w/1:1 Interleave
- Ports: 1 Serial, 1 Parallel
- 8 Expansion Slots: 6) 16-bit, 2) 8-bit
- Enhanced 101 Key Keyboard
- Clock Calendar w/Battery Backup
- Swan Setup & Utilities Diskette

### Options:

- 80387SX Co-processor
- Upgrades: 1.5, 2, 3, 4, 5, 6 or 8MB
- GW BASIC/MS-DOS add \$89

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Base System with Single Floppy, No Video

386SX	VIDEO OPTIONS Include Monitor & Video Adapter			
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w/48MB (24ms) & 1:1 Interleave	\$1999	\$2048	\$2198	\$2498
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w/128MB (17ms) & 1:1 Interleave	\$2994	\$3043	\$3193	\$3493



## Swan 286/12

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- 512K of RAM Expandable to 5MB
- Shadow BIOS
- 0 Wait State
- 80287 Co-processor Socket
- 200W Power Supply
- 5 Device Bays: 3 Exposed, 2 Internal
- 1.2MB 5.25" or 1.44MB 3.5" Floppy Drive
- Dual Floppy/Dual H.D. Controller
- Ports: 1 Serial, 1 Parallel
- 8 Expansion Slots: 6) 16-bit, 2) 8-bit
- Enhanced 101 Key Keyboard
- Clock Calendar w/Battery Backup
- Swan Setup & Utilities Diskette

### Options:

- 80287 Co-processor
- Upgrade to 640K, 1, 2, 3 or 5MB
- GW BASIC/MS-DOS add \$89

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Base System with Single Floppy, No Video

286/12	VIDEO OPTIONS Include Monitor & Video Adapter			
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## Swan XT10

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- 8 Expansion Slots
- Enhanced 101 Key Keyboard
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### Options:

- 8087 Co-processor
- 3.5" Floppy Drive
- GW BASIC/MS-DOS add \$89

# \$549

Base System with Single Floppy, No Video

XT10	VIDEO OPTIONS Include Monitor & Video Adapter			
	Drive Options	Mono	CGA	EGA VGA
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Dual Floppy	\$779	\$779	\$1178	\$1278
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CIRCLE 249 ON READER SERVICE CARD

by Lori Grunin

# Advisor

## MATH REVIEW

I've just retired (at 73), and instead of letting the moss grow under my feet, I've decided to begin full-time studies in my first love, electrical engineering. It's been 40 years since I studied math. Are there any programs on the market that will "teach" me algebra, trigonometry, precalculus, and calculus?

Michael Wainstock  
Bloomfield Hills, Michigan

**PC** Jumping into a subject after you've been away from it for so long can be a frustrating experience, as well as a stimulating and rewarding one. Fortunately for you, True BASIC has software designed to minimize your pain and maximize your gain. Its Kemeny-Kurtz Math Series is composed of six packages, including three on the subjects you're interested in: *Algebra*, *Pre-Calculus*, and *Calculus*. If you become even more ambitious, *Discrete Math*, *Probability*, and *Statistics* are also available from the same company (\$49.95 each; 12 Commerce Ave., West Lebanon, NH 03784; (603) 298-5655, (800) TR-BASIC).

These packages supplement classroom and textbook teachings; if you've never seen a derivative before, this isn't the place to start. But if you have a nodding acquaintance with the subject, you can use the software to develop a more intuitive understanding of the relations underlying the mechanics of, say, taking a derivative or solving an equation.

For example, you can enter a function, see its graph, find the derivative, and superimpose the derivative's graph on the first to see how the two are related. You can also change coefficients and observe how the altered function compares with the original. To display these graphs requires a graphics adapter.

## MORE ON DVORAK

You left out important information when you answered Doug Stroud's Dvorak keyboard inquiry in PC Advisor in your

- **MATH REVIEW:**  
A computerized tutor for algebra and calculus students.
- **MORE ON DVORAK:**  
Additional information for Dvorak keyboard users.
- **CTRL-CAPS SWITCH:**  
Remapping your Ctrl and Caps Lock keys.
- **GOOD GRAMMAR:**  
In search of an automated editor.
- **MISSED CONNECTIONS:**  
Using standard plugs in a switched outlet.

February 28, 1989, issue. You should have told him about the number-one source of Dvorak keyboard information: Randy Cassingham's Freelance Communications. Freelance has published a book on Dvorak keyboards (*The Dvorak Keyboard*), puts out a quarterly newsletter on the subject (*Dvorak Developments*), and issues regular updates to a long list of Dvorak-related products and services. If you're curious about the state of the Dvorak keyboard world, write to Freelance Communications, P.O. Box 1895, Upland, CA 91785.

David Beedon  
Renton, Washington

**PC** Thanks for the update. Prelo also offers a keyboard with the Dvorak layout (14202 Galy St., Tustin, CA 92680; (714) 544-3041). It comes in two versions: a \$139 101-key model and a \$109 84-key model (add \$6 to each price for shipping and handling).

And if Freelance Communications' offerings still don't provide enough

information, the Dvorak International Federation (P.O. Box 128, Brandon, VT 05733) offers a supplementary source of materials.

## CTRL-CAPS SWITCH

I am at last having to go to a new keyboard—the type where Caps Lock has been moved into the Ctrl key position, next to the A key, and the Ctrl key has been moved down to the south 40. Can you direct me to a program that switches the functions of the Ctrl and the Caps Lock keys?

Michael Ham  
Santa Cruz, California

**PC** Two tiny programs, available from the Utilities database on PC Magazine Net, will alleviate your current digital connotations: CTRLCAP.COM and IBMFX.COM. I suggest that you download both (each takes less than a minute to download, and the only charge is for connect time) because I've found that CTRLCAP isn't compatible with some keyboard BIOSs, and incompatibilities could crop up with IBMFX, as well. One of them should work for you, however.

## GOOD GRAMMAR

I am currently looking for grammar-checking software and would appreciate any information that you have on the different programs.

Thomas Everson  
Castro Valley, California

**PC** The first bit of information I can offer about grammar checkers isn't very reassuring: in order to use them constructively, you have to know something about grammar. When a spelling checker flags words as incorrect because they're not in the program's limited lexicon, you just have to drag out your old dictionary to look them up. But when a grammar checker flags a supposed error, you have to decide whether the software is right and what the correction should be.

Therefore, the grammar checker of your dreams should not only be good at finding

## Advisor

mistakes, but it should also offer good advice. In this respect, the best of the grammar-conscious packages is Reference Software's *Grammatik III* (\$99; 330 Townsend, #123, San Francisco, CA 94107; (415) 541-0222). Compared with its competitors—RightSoft's *RightWriter* (\$95; 4545 Samuel St., Sarasota, FL 34233; (813) 923-0233) and Lifetree's *Correct Grammar for WordPerfect* (\$99; 411 Pacific St., Monterey, CA 93940; (408) 373-4718, (800) 543-3873), *Grammatik* gives you the most help when it comes to figuring out what you've done wrong.

Both *Grammatik* and *Correct Grammar* allow you to proofread and edit your documents interactively, and all three products let you generate a checked and commented output file either manually or as a batch job. *RightWriter*'s method of flagging errors in the output file—uppercase letters bracketed by chevrons—is the easiest to read, and the program offers good style analysis (as does *Grammatik*). It also comes with several

**The grammar checker  
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configuration files for various types of writing, such as business and technical. Reference Software offers an optional utility for running *Grammatik* as a TSR, but the utility demands 100K. None of these programs skimps on RAM requirements: *Correct Grammar* needs 460K free, *RightWriter* 340K (with menus), *Grammatik* a more reasonable 260K. All three come with macros that streamline use with your favorite word processor—just

as long as it's *WordPerfect*.

A review of *Grammatik III* and *RightWriter* appears on page 38 in the First Looks section of our February 14, 1989, issue.

### MISSED CONNECTIONS

Does anyone make an adapter plug that will enable me to connect my monitor's standard three-prong plug to the switched outlet on the rear of my 286 clone?

Alvin Flesher  
Baltimore, Maryland

**PC**

Mark Twain Computer makes a 24-inch cable, aptly named The Cable the Cloners Forgot (\$9.95; 900 N. 3rd St., La Grange, MO 63448; (800) 637-2984). Now you too can save an outlet and simultaneously power up your computer and monitor.

### ASK THE ADVISOR

Send your questions to Advisor, *PC Magazine*, One Park Avenue, New York, NY 10016 or upload to PC MagNet (see the "By Modem" sidebar in the Utilities column for access information). Please specify your equipment. ■



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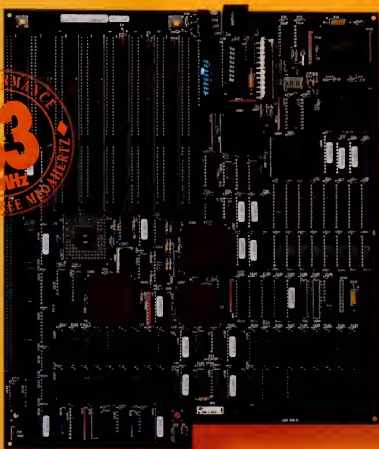
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# First Looks

Hands-on Reviews of the Latest Products

## 1-2-3, Release 2.2: Modest Upgrade Adds File Linking, Network Support, Improved Graphics

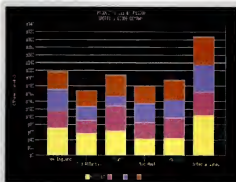
HANDS ON  
by Craig Stinson

Now that Release 3 has been sitting on the shelves for a month or so, Lotus Development Corp. has introduced *Lotus 1-2-3, Release 2.2*, a program designed to modernize the company standard without forsaking the huge constituency of 8088-based users. Everything considered, the \$495 enhancement turns out to be a rather modest upgrade.

Release 2.2 incorporates the Speedup and Learn add-ins and continues the bundling of the Macro Manager and Allways add-ins. It also squeezes in what it can of Release 3's new functionality. But for the most part, it remains good old 1-2-3, Release 2. The function library is the same, and the macro language and performance are almost the same.

The most important new capabilities you'll see in this release are file linking and network support. Release 2.2's file linking provides a weak form of the three-dimensionality that's the hallmark of Release 3. You can't create multipage worksheets, but you can write formulas that reference values in other worksheets. This important feature encourages modular worksheet design, allows large (multifile) models on systems without expanded memory, and simplifies the use of working assumptions or historical data in multiple contexts.

CONTINUES ON PAGE 35



Lotus 1-2-3, Release 2.2, offers basically the same set of graphing services as its predecessor, but it staggers the x-axis labels, provides more attractive margins, and avoids drawing grid lines across graph bars.

## Zenith MinisPort: A Step Up from the T1000, A Step Down from the UltraLite

HANDS ON  
by Mitt Jones

On paper, at least, the Zenith MinisPort looks like a traveling technophile's dream come true. Like the upscale NEC UltraLite, the MinisPort packs a backlit LCD screen, battery-backed RAMdisk, and standard-sized laptop keyboard into a case a little larger than a spiral-bound notebook. Unlike the

UltraLite, it also includes an internal floppy disk drive, a removable battery pack, and built-in parallel and external monitor ports, all for a list price of \$1,999.

The 8-MHz 80C88-based MinisPort weighs closer to the 6.4 pounds of the Toshiba T1000 than the 4.4 of the UltraLite. Our evaluation unit, which included the optional internal modem, weighed 6.3 pounds.

Though far smaller than the

T1000, the MinisPort also pushes the size limit of its notebook-laptop moniker. In all fairness, thickness probably counts more than any other measurement when you need to tuck a laptop into your briefcase, and the MinisPort boasts the same 1.3-inch thickness as the UltraLite. At 12.4 inches wide and 9.8 inches deep, however, the MinisPort measures a full 0.5 inch wider and 1.6 inch

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MAGAZINE  
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**Simple Win**  
Brings icon-based file management to  
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The best-selling personal finance program streamlines funds transfers ..... 46

## First Looks

### Zenith MinisPort

CONTINUED FROM PAGE 33

es deeper than the UltraLite. The difference may not sound like much, but with the additional weight, the MinisPort seems more bulky.

The next problem, surprisingly enough, is the MinisPort's backlit screen. Zenith made its name in the laptop arena by pioneering large, crisp backlit screens that rate no less than fantastic. In contrast, the MinisPort screen is small—slightly smaller than that of the TI100—and dim at best.

The MinisPort carries a base-configuration price \$1,000 less than that of the UltraLite, but even the cost advantage begins to dwindle upon closer inspection. For instance, whereas the UltraLite's \$2,999 base price includes a 2,400-bit-per-second internal modem, you have to pay an additional \$199 for the MinisPort's 1,200-bps internal modem.

Both the MinisPort and the UltraLite feature battery-backed RAMdisks that work, in effect, like small hard disks, but there are a few differences here as well. The first disparity lies in their size. While the MinisPort comes standard with 640K DOS memory plus 384K for the RAMdisk, the UltraLite is configured with 640K DOS memory plus a full megabyte of RAMdisk. With either machine, you'll want the additional megabyte of memory to make the RAMdisk truly useful, and here the MinisPort loses another price advantage: the step up will cost you \$700 with the UltraLite and \$800 with the MinisPort.

In addition, the backup battery source for the MinisPort RAMdisk seems dangerously limited. The machine supplies power to the RAMdisk from its primary rechargeable nickel cadmium battery pack and switches to its nonrechargeable lithium batteries when the pack drains. In contrast, the UltraLite backs its RAMdisk with a rechargeable nickel cadmium battery, separate from the primary rechargeable lithium battery.

The rechargeable nickel cadmium battery supplies about 3 weeks of power between charges.

The difference? Deplete the 3-hour battery life of your MinisPort on a cross-country flight, and immediately you're cutting into the 80-hour life of your lithium backup batteries. Charge the battery pack 10 hours later and you've got only 70 hours of remaining life. Zenith built in a "change battery" warning, but you have to turn the computer on to get the message.

Both machines include DOS, a setup program, and a file-transfer program in ROM—FastLynx LX in the case of the MinisPort. You'll need the transfer program to get your applications to either the MinisPort's RAMdisk or its 2-inch floppy disk drive.

Here again, the cost advantage dwindles. The UltraLite comes with its own serial file-transfer cable—a necessity, since the unit offers only a non-standard serial port. The MinisPort comes with a standard 9-



The Zenith MinisPort features a 2-inch floppy disk drive.

pin serial port, but to get the cable, you must either buy one yourself or opt for the MinisPort's \$139 start-up kit, which includes the cable, ten 2-inch disks, and a Leatherette slipcover. You'll want the slipcover and you'll need the disks—which normally list for \$99 per box of ten—making the start-up kit an obvious choice.

Despite its failings, the MinisPort does boast advantages over the UltraLite, and its 2-inch floppy disk drive ranks high on the list. The 720K disks look more like toys than storage media, but they seem to work just fine. Zenith intends to order 20 boxes of the disks for every machine made and promises

that they will be available wherever the machine is sold.

Another significant advantage of the MinisPort is its battery pack. First, the battery pack boasts a life of 3 hours under normal use with backlighting on; the UltraLite's battery life is 2 hours. In addition, while the UltraLite's battery pack is wired in, the MinisPort's slides out easily and can be replaced in a matter of seconds.

The MinisPort offers a full range of standard I/O ports, including a monitor port that can drive an external monochrome or CGA monitor and a Centronics-compatible parallel port. You'll also find an external drive port, which accommodates an optional 3.5- or 5.25-inch floppy disk drive.

The MinisPort keyboard ranks with the best. As with most laptops, you'll find a few key-layout surprises. However, the MinisPort keyboard has an excellent feel and doesn't take too much getting used to.

Our evaluation unit worked well with two exceptions: nei-

### BENCHMARK TESTS: ZENITH MINISPORT



Relative Times  
(8-MHz IBM PC AT = 100)

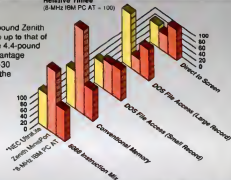
When it comes to speed, the 6.3-pound Zenith MinisPort's performance isn't quite up to that of its more diminutive competitor, the 4.4-pound NEC UltraLite. The UltraLite's advantage stems in part from its 9.54-MHz V-30 processor, which is pitted against the MinisPort's 8-MHz 80C86.

The 8086 Instruction Mix benchmark tests a series of tasks specific to the 8086 chip. Since this test shows how the CPU operates in the context of the bus, processor, system memory, and motherboard architecture, a faster time means better overall computer performance.

The Conventional Memory benchmark test measures the read/write speed of the first 640K of memory. Slower relative times can indicate the presence of memory wait states or memory chips rated at slower access speeds.

The DOS File Access (Small Records) benchmark test times disk throughput as a result of mechanical disk drive speed, hard disk controller function, and bus speed. The test is performed without software disk caching. Fast times are advantageous for programs that work with many short segments of data.

The DOS File Access (Large Records) benchmark test times disk throughput as a result of mechanical disk drive speed, hard disk controller



Performance Times  
(Times given in seconds)

\* NEC UltraLite  
Zenith MinisPort  
8-MHz IBM PC AT

Performance Times (Times given in seconds)	8086 Instruction Mix	Conventional Memory	DOS File Access (Small Records)	DOS File Access (Large Records)	Direct to Screen
* NEC UltraLite	10.16	1.60	44.00	26.63	6.53
Zenith MinisPort	18.73	3.63	52.14	7.65	5.28
8-MHz IBM PC AT	9.14	1.32	54.32	16.22	9.06

\* This product was not reviewed, but we are reporting its test results for comparison.

function, and bus speed. This test minimizes the effect of small hardware caches on disk subsystem performance. It is performed without software disk caching. Fast times are advantageous when large files are loaded.

The Direct to Screen benchmark test indicates the speed of the video adapter memory. Good scores indicate that information can get to the screen quickly, particularly for programs that avoid the computer's BIOS and go directly to the screen.

## First Looks

ther of the two preproduction 1,200-bps modems seemed to work at all, and *FastLynx* file transfers through COM1 worked without a hitch initially but failed to work on another attempt.

Is the MinisPort a good buy? That depends largely on what you want in a laptop. If your choice is between settling with the T1000 or taking a step up to the MinisPort's base configuration, by all means take the step. The MinisPort is faster, has a backlit screen, and leaves a lot more room in your carry-on bag or briefcase.

If money is not an issue, you may be disappointed with the MinisPort once you've set eyes on the UltraLite. Fully configured with 2MB of RAM, 1,200-bps modem, and start-up kit, the MinisPort retails for \$3,137, compared with \$3,699 for a similarly equipped UltraLite. Even if you can forget about the UltraLite's sleek, stylish look, the MinisPort's more complete set of features doesn't quite make up for the UltraLite's advantages in size, weight, and screen quality. Simply put, you actually want to carry the UltraLite along nearly anywhere you go; the MinisPort somehow still seems like a burden. ■



Lotus 1-2-3, Release 2.2, uses eight setting sheets, allowing you to see current selections at a glance.

### Lotus 1-2-3

CONTINUED FROM PAGE 33

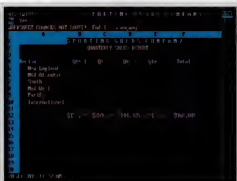
With 2.2, however, you're limited to grabbing values, as constants, from one external cell at a time. You can't use an external reference as a function argument or as part of a formula that involves a mathematical operation. Moreover, if you use the /Move command to relocate the source cell in the external file, Release 2.2 does not update the referencing formula.

Release 2.2's network support is similar to that of Release 3. In a multiuser environment, each file is accorded a single "reservation," which normally belongs to the first user who loads the file. Without the reservation, you can't save (except by changing the filename). Commands on the /File menu let you relinquish the reservation (if you own it) or claim it (if you don't and it's available). A Link-Refresh command lets you update all external references manually.

There are other changes in Release 2.2 that have counterparts in Release 3. Macro names, for example, are no longer limited to the backslash key followed by an alpha character (or 0). Any range name will do, which means that your worksheet can hold all of the macros that you can concoct. A new macro run key (Alt-F3) lets you invoke a macro from a menu of range names or just point to a block of code.

options to back up the last version on-disk before the new file is written. This is not automatic backup protection; you have to select "backup" instead of "replace" each time you want to create the disk copy. But it's better than nothing.

Other forms of disaster insurance include an Undo command and a warning prompt that appears when you try to quit without saving your work. Both are particularly welcome and long overdue, but you have to wonder why Lotus is still willing to let you lose unsaved work via /Worksheet Erase or /File Retrieve—without even the option of having a warning prompt appear.



Lotus 1-2-3, Release 2.2, prompts you if you quit without saving your work. It does not prompt you, however, if you use /Worksheet Erase or /File Retrieve.

As mentioned, the new release also incorporates Learn, the macro-recording add-in brought out by Lotus a couple of years ago. Learn is not smart enough to collapse multiple cursor moves into condensed format ({D 13}), for example, instead of 13 {D}s), but at least it avoids Release 3's mistake of converting cursor moves to fixed addresses.

A /Range Search command brings word processor-like search/replace capability to your spreadsheet. The only hitch: the command won't find numeric constants or formula results—just labels and formula text. (The same limitations apply in Release 3.)

The /File Save and /File Xtract commands now include

Release 2.2's Undo feature is cruder than Release 3's. Rather than tracking the steps required to reverse a worksheet change, Release 2.2 simply creates an in-memory copy of your entire file each time you start a move that might lead to a change. That strategy requires the program to allocate a huge amount of Undo buffer memory, reducing your available space by more than half if you don't have expanded memory. It also means that as soon as you begin a menu command, you forgo the opportunity to reverse your previous action.

Fortunately, Undo will use expanded memory if you have it. You can turn Undo off at any time, which you'll have to do if

CONTINUES ON PAGE 36

### FACT FILE

**Zenith MinisPort**  
 Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60005; (800) 842-9000.  
 List Price: With 1MB RAM, \$1,999; with 2MB RAM, \$2,799.  
 1,200-bps internal modem, \$190; start-up kit, \$130;  
 additional battery pack, \$70;  
 additional battery charger, \$100; box of ten 2-inch disks, \$89; external 5.25-inch floppy disk drive, \$399; external 720K 3.5-inch floppy disk drive, \$299.  
 In Short: A feature-laden 5.9-pound notebook-sized laptop. Offers the advantages of a removable battery pack, 2-inch disk drive, and full assortment of I/O ports. Suffers from a small, weak backlit screen.

CIRCLE 446 ON READER SERVICE CARD

## First Looks

### Lotus 1-2-3

CONTINUED FROM PAGE 35

you're working without EMS and you want to use Allways.

Graphs in Release 2.2 are a little neater than in 2.01. X-axis labels are automatically staggered to avoid clobbering one another, and the program refrains from drawing gridlines across data bars. In a nod toward Microsoft Excel, the 2.2 menu includes commands that let you specify a whole set of

data ranges as a single block; you just tell the program whether you want it to plot row by row or column by column.

So much for Release 2.2 being a pale imitation of Release 3. Release 2.2 also offers a few features that either have weaker counterparts or none at all in Release 3.

One of the most important is the command-line switch, which lets you invoke Release 2.2 with a particular worksheet in place. This long-overdue improvement (it could easily have been done in 2.01, and its absence in Release 3 is baffling)

lets you use programs like *The Norton Commander* or the DOS 4 shell to launch a 1-2-3 worksheet by clicking a mouse on its filename.

Release 2.2's minimal recalculation is clearly preferable to Release 3's background recalculation. With Natural recalculation selected, Release 2.2 recalculates just those cells that might have new values, in most cases returning control to you immediately. Release 3, on the other hand, reevaluates the whole sheet but lets you work with jerky cursor control while it does so.

Release 2.2's Step mode has been enhanced, while Release 3's is just like Release 2.01's. It's still not much of a debugging environment, but the 2.2 stepper at least displays the address and contents of the cell being executed and highlights each command in the cell as you step through it.

Then, of course, there are the Macro Manager and Allways add-ins. The former lets you keep a battery of macros in memory, ready to be executed but not confined to the worksheet at hand. The latter is the publishing utility that turns out boardroom-quality printouts with multiple fonts and sizes, rules and shading, and graphs intermixed with text. Release 3 has no need for Macro Manager, but it desperately needs Allways and won't have it for a while.

So should you buy this upgrade? If you have the iron to run Release 3, the answer is no, notwithstanding the last several paragraphs. Release 3 has so many powerful features that its few shortcomings can and should be overlooked.

If you can't run Release 3 and you don't have Allways, by all means upgrade. Allways by itself is worth the upgrade price of \$150. But if you have a well-stocked arsenal of 2.01 add-ins, including Allways, and you don't work in a multiuser environment, there's no compelling reason to spring for 2.2.

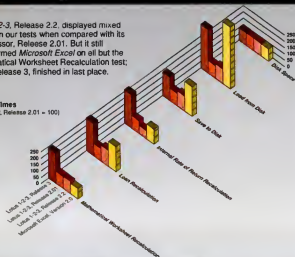


### PERFORMANCE TESTS: LOTUS 1-2-3, RELEASE 2.2

Lotus 1-2-3, Release 2.2, displayed mixed results on our tests when compared with its predecessor, Release 2.01. But it still outperformed Microsoft Excel on all but the Mathematical Worksheet Recalculation test; 1-2-3, Release 3, finished in last place.

#### Relative Times

(Lotus 1-2-3, Release 2.01 = 100)



#### Performance Times

(Times given in seconds, disk space given in kilobytes)

	Mathematical Worksheet Recalculation	Loan Recalculation	Internal Rate of Return Recalculation	Save to Disk	Load from Disk	Disk Space
Lotus 1-2-3, Release 3	144.32	3.93	6.49	7.05	20.85	83.00
Lotus 1-2-3, Release 2.01	59.83	1.52	2.43	3.75	6.02	61.00
Lotus 1-2-3, Release 2.2	59.73	1.93	1.58	4.50	6.94	61.00
Microsoft Excel, Version 2.0	48.96	3.02	2.88	8.85	29.51	79.00

#### Mathematical Worksheet Recalculation

Recalculation reports the time taken to calculate a Lotus 1-2-3 2.01 worksheet with 1,950 mathematical functions and 434 text cells. Lower times indicate more efficient implementation of standard spreadsheet functions.

The Loan Recalculation test worksheet calculates the monthly payment and displays the amortization schedule for a 10-year mortgage based on any given loan principal. This test is a typical spreadsheet application.

Internal Rate of Return Recalculation tests the Net Present Value and Internal Rate of Return functions. These computation-intensive formulas indicate the efficiency of a program's calculation and Internal Rate of Return algorithm.

The Save to Disk test measures how long it takes the spreadsheet program to save the Mathematical Worksheet Recalculation test file to disk, using the product's native file format.

The Load from Disk test measures how long it takes the spreadsheet

program to read the Mathematical Worksheet Recalculation test file from disk, using the product's native file format.

Disk Space reports the size of the Mathematical Worksheet Recalculation file when the spreadsheet program saves it to disk in the program's native file format. A smaller number here is better, leaving room for more or bigger files on the same disk.



### FACT FILE

#### Lotus 1-2-3, Release 2.2

Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; (617) 557-8500. List Price: \$495; upgrade from Release 2.01, \$150.

Requires: 320K (512K to use Undo or run Allways), DOS 2.0 or later.

In Short: A modest upgrade that dresses up 1-2-3 without abandoning its B088-based user population. Major improvements are file linking, network support, the inclusion of Allways, expanded macro capability, minimal recalculation, search/replace, and Undo.

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## First Looks

# UltraScript PC Adds PostScript Compatibility To Your Old Printer

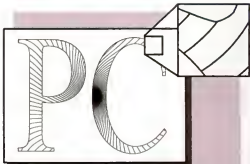
HANDS ON  
by Alfred Poor

We've said it before: a limited budget doesn't have to keep you from adding PostScript capability to the printer that you already own. If your finances preclude the purchase of an expensive add-in board for your HP LaserJet, or if you don't own a laser

printer but want to bring PostScript to your dot matrix or ink jet printer, you can try The Laser Connection's \$195 *UltraScript PC*, the latest low-cost program that lets your PC interpret PostScript code, store the resultant bitmap image, and then send the file to an ordinary non-PostScript printer.

*UltraScript PC* joins Custom Applications' *Freedom of Press* (\$495) and LaserGo's *GoScript* (\$195 with 13 fonts, \$395 with 35 fonts), the first programs to make PostScript accessible to users of non-PostScript printers. Like these two, *UltraScript PC* lets you print on HP LaserJet Series II printers with at least 1MB of RAM, as well as on a wide range of dot matrix (Epson FX, LX, and LQ; IBM Graphics and Proprinter) and ink jet (HP DeskJet; Canon Bubble-Jet) printers.

Unlike the other programs,



*UltraScript PC* is a fast PostScript emulator but it shows roughness in its font-smoothing process.

*UltraScript PC* does not force you to print from disk files. Provided that you have at least 1MB of extended memory, you can print directly from any application that does not write directly to the printer port. In general, this means that you can use *UltraScript PC* to print PostScript output from within your favorite desktop publishing or graphics program. With *GoScript* and *Freedom of Press*, you must print your file to disk, exit the application with which you've been working, and then print your image in batch mode from the DOS prompt.

All three programs work best with some extra memory, although *Freedom of Press* and *GoScript* require expanded, not extended, memory. While *UltraScript PC* will run with only 640K, printing performance will suffer. On the PC Labs Text Speed test, *UltraScript PC* took nearly 15 minutes to print a single page of text when only 640K of RAM was installed, compared to nearly one page per minute when 1MB of extended RAM was installed. That speed put the program just ahead of *Freedom of Press* and about half a page behind *GoScript* on our Text Speed tests. On the PostScript Graphics Speed test, *UltraScript PC* blew away the other programs—and the Apple LaserWriter IINTX—producing excellent output.

*UltraScript PC* comes packaged with 25 typefaces in the following styles: Times, Helvetica, Courier, Lucida, Lucida Sans, Lucida Sans Typewriter,

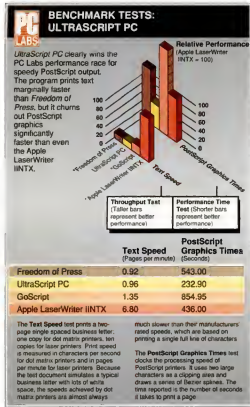
and a symbol font. However, if you spend \$300 more for *UltraScript PC Plus*, you get an additional 22 typefaces, including Helvetica Narrow, Palatino, and ITC Zapf Dingbats. This enhanced version gives you 12 more typefaces than either of the competing packages.

*UltraScript PC* offers speed, quality, and plenty of fonts, all at an affordable price. If you want to ease into PostScript without shelling out thousands of dollars for a PostScript-compatible laser printer or add-in board, this is a great place to start.

**FACT FILE**

**UltraScript PC**  
The Laser Connection, 7851 Schilling Park W., Mobile, AL 36608; (800) 523-2696, (205) 633-7223  
List Price: \$195; *UltraScript PC Plus*, \$495  
Requires: 640K RAM (640K plus 800K extended required to print from within application; 640K only not recommended), 4MB hard disk space, DOS 3.10 or later. Printer: HP LaserJet or compatible with: 1MB RAM; HP DeskJet; Canon Bubble-Jet; Epson LQ, LX, FX, or compatible; IBM Proprinter or Graphics printer.  
In Short: *UltraScript PC* interprets PostScript page-description commands and produces bitmap images for printing on non-PostScript printers. Requires extended memory for acceptable performance; produces excellent results.

CIRCLE 441 ON READER SERVICE CARD





"Have you ever seen anyone have fun paying his bills?" Terry asked. John responded, "It looks so fast and easy - Quicken must really make it hassle-free."



## "They Laughed When I Said I Actually Enjoy Doing My Finances"

**Y**ou know how it is when you find something you really like. You tell all your friends about it. That's what I did after I discovered Quicken.

At first, none of them believed how much time and hassle Quicken saves me. Especially since it costs so little. But once they tried it for themselves, they were sold.

Hey - I'm not a millionaire or a tycoon. My finances aren't the most complicated in the world. Even so, they took too much time. Plus, I didn't always have the information I needed for taxes, budgeting, and keeping better track of my cash flow.

Then I heard about Quicken.

### An Incredible Time Saver

It's amazing - I now *enjoy* a chore I used to dread. You see, Quicken does all the tedious, time-consuming work for me. I finish in minutes what used to take hours! Quicken actually learns my regular bills. I simply confirm payment amounts each month. Then it hands me printed checks already addressed for mailing. I save at least two hours every month - that's like three extra days of vacation each year.

Even when I'm away from my computer, Quicken saves me time. I can enter transactions with just a few keystrokes, and Quicken eliminates the math and the mistakes.

### No Accounting Mumbo Jumbo

I know nothing about accounting. I don't know "debits" from "credits." With Quicken, I don't need to. It speaks in plain English. *It's a breeze to learn* and use because it works just like my paper checkbook. Even the first time, I was up and running in five minutes.

Quicken doesn't change *how* I do my finances, just *how fast* I finish them.

### I Get More Insight with Less Work

For the first time, I know exactly where *all* my money is going. I'm on top of paying bills, reconciling accounts, and what's more, at the press of a button, Quicken generates insightful reports like Income and Expense, Budget vs. Actual, Net Worth, and more. And, I finish taxes faster, too. Quicken's Tax Summary reports support my deductions, plus it links to TurboTax® and J. K. Lasser's Your Income Tax® software.

### Powerful Business Features

Quicken even handles my business bookkeeping. It produces financial statements like P&Ls, Balance Sheets, and other useful reports. It forecasts cash flow, tracks A/R, A/P, payroll, jobs, clients, and more.

Quicken is so versatile, I wasn't surprised to learn that over half its customers use it for small business bookkeeping.

### No Wonder It's #1 in the World

Quicken is the best selling finance software in the world. Bill Howard of PC Magazine says, "Quicken is about as good as software gets - powerful, affordable and easy to use." (12/27/88)



### NEW VERSION 3.0

Quicken 3.0 is even easier, faster, and offers over 50 new features, including:

- New credit card, cash, asset, and liability accounts
- Combines information from all accounts into consolidated reports
- New Tax Summary and Net Worth/Balance Sheet reports
- New wallet-size checks
- Variable monthly budget amounts
- Data import and export
- Link with CheckFree™, the nation's electronic payment system

### Try Quicken FREE for 30 Days!

I'll admit my friends were skeptical. So I told *them* to do what I did. Try Quicken FREE for 30 days by ordering below. The folks at Intuit are so sure you'll be satisfied that they'll let you return it for a full refund...for any reason.

You, too, could enjoy doing your finances. Trust me. It happens.

**\$59<sup>95</sup>**



### Sure

I'd like a shortcut to taking better care of my finances. I'll take Quicken at \$59.95, including free shipping by air. I understand I may return it for a full refund within 30 days if I'm not completely satisfied. (CA residents, please add sales tax. For coupon orders, allow 10 days for delivery in U.S., and longer to Canada.)

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Daytime Phone (  )

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Preferred payment method (check one)

☐ Check enclosed (no purchase orders or COD, please)

☐ Visa ☐ MasterCard ☐ American Express

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**Intuit**  
540 University Avenue  
Palo Alto, California 94301

Or, call:  
**1-800-624-8742**  
in U.S. and Canada.





# Central Fidelity Is Banking On AT&T Computers.

*Left to Right  
Dean Dodrill,  
AT&T Area Technical Manager*

*Jay Livingston,  
Corporate Executive Officer,  
Central Fidelity Bank,  
Richmond, Virginia*

Richmond, Virginia  
February 2, 1989

Central Fidelity Bank is among the nation's top 100 commercial banks with \$4.8 billion in assets. Looking to extend its fourteen-year record earnings streak, the bank commissioned its data processing division to deliver a vital strategic initiative, improve productivity, enhance sales opportunities, and provide faster customer service in the bank's nearly two hundred branch offices. Jay Livingston met recently with Dean Dodrill of AT&T to review their work together.

**Jay:** Service is what bank customers expect. Faster service improves customer satisfaction and leads to more profitable relationships. When you speed up service, everyone is more productive, and we can spend more time with customers selling the bank's financial products.

**Dean:** Service and selling both depend on information. Our challenge was to provide the branches with rapid access to customer information and present that information to branch personnel in the most meaningful way. This could only be accomplished with a distributed, networked computing approach.

**Jay:** That's right. Our first priority was service and sales support in our branches, which meant fast, accurate retrieval and dispersal of information was crucial. AT&T's banking architecture provided that.

**Dean:** Early on, you talked about cost-effectiveness, return on investment, and a strategy for future growth and functionality. Remember that?

**Jay:** With an emphasis on profitability. We had major investments in existing systems and a lot of branches. AT&T's open systems approach didn't require trade-offs or expensive host additions, which is one of the rea-

sons you got the business. AT&T's creative alternatives surprised us.

**Dean:** The ease of networking AT&T WGS computers was fundamental to our proposal. We delivered maximum functionality, flexibility, and reliability to every workstation in each branch.

**Jay:** And StarLAN was a terrific way to connect and share branch resources. You made the most of our assets, including the intangible ones.

**Dean:** Like your customer databases—we found ways to further develop relationships with existing customers. The applications development tools we built saved time for your developers. New products and services can now be added quickly to both platform and teller software, so service and sales can continually improve.

**Jay:** Every bank employee associated with this system has become more productive. In my twenty-three years of banking, I've never seen a vendor provide such high-quality service and support. Central Fidelity Bank and AT&T are well positioned for the future.

## The Central Fidelity Computer Solution:

### THE CHALLENGE

Build a distributed, networked computing solution that would improve productivity, customer service, and sales.

### THE RESPONSE

The AT&T Retail Banking Solution. An integrated systems solution that provides effective bank branch platform and teller automation. Supported by AT&T WorkGroup Systems, AT&T StarLAN, and software provided by OnLine Financial Communications Systems, Inc. And AT&T Application Foundation developed by AT&T Bell Laboratories provides a highly productive software customization environment.

### THE RESULTS

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## First Looks

# Simple Win Picks Up Where Windows Leaves Off

HANDS ON  
by Richard Hale Shaw

Neither Microsoft Windows nor the OS/2 Presentation Manager has an icon-based approach to managing applications. Recognizing the benefits this method of handling applications has to offer, IBM has announced that an upcoming release of PM will include icons to represent files and directories. But Matesys's \$99 *Simple Win* lets you create an icon-based front end for Windows today.

*Simple Win* consists of four programs. The Applications Loader is the heart of the program for end users. It lets you select icons from the main folder and gives you the option of displaying a folder in one of two ways—in a matrix with tiles or in a long listing with the title and descriptive text off to one side. It also lets you load and run programs that don't have icons.

You can use the second program, the Applications Organizer, to create icons and folders and to associate icons with folders and applications. The Applications Organizer lets you capture any image displayed on the Windows screen and reduce it to the size of an icon. If a program already has an icon, you can capture it directly into a folder.

If you are associating the icon with an application, the Applications Organizer will use a dialog box to prompt you for the title of the application, the name of the executable program, the command-line parameters, and the start-up directory. You can optionally specify a password and help text. In addition, you can have *Simple Win* prompt the user for a filename when the program is run. Thus, when the user selects the program's icon, *Simple Win* will create a directory list box and let the user select a filename.

The Applications Organizer also lets you create folders of

icons. Each folder can contain up to 12 icons, which in turn can represent application programs or other folders. *Simple Win* stores the icon, the folder, and application information in a configuration file. You can use a "pack" option to compress the file and reclaim icon space that remains when you delete an icon. However, you shouldn't

superior to Windows' MS-DOS Executive and bears a striking resemblance to PM's File System program. However, it is visually more appealing and informative than File System, as well as easier to use.

By clicking on a directory name in the File Manager's tree display, you can open a window to display its contents. A set of global options controls whether the directory windows will display files as icons or as filenames that can include the file size, date, and time.

It's easy to copy a file from one directory to another: open both directory windows, click on the filename or icon with the

them as a group to the destination window. You can also move files between directories, but you have to change one of the global options first—one of the few weaknesses in this fine program.

The File Manager also provides pull-down menus that let you create, remove, back up, and restore directories, as well as format or copy a disk. While the program uses the appropriate DOS command (such as DISKCOPY) to pull this off, you'd never know it: a dialog box lets you choose the options and specify the parameters, making these commands a snap to use. It's too bad the designers

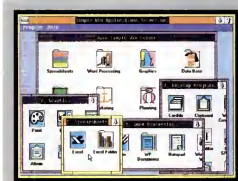
of Windows' MS-DOS Executive or PM's File System didn't think of the same simple, helpful trick.

One of the File Manager's more useful features is the trash can icon, which hides a "garbage" directory. You can delete a file by clicking on the filename and dragging it to the trash can.

One handy program feature is that until you actually empty the trash can, you can recover any file you stored there by clicking on the trash can icon and dragging the file back to the appropriate directory. Overall, the File Manager is the program that Microsoft forgot to include with Windows.

*Simple Win* also includes the Album, a program that enhances Windows' Clipboard. The Album lets you store 999 images on-disk, and you can use it to bring disparate Clipboard images together in one place before placing them in a file or an application.

*Simple Win* is a well-designed package that offers a lot of value for the money. Do not be fooled by the small number of programs, their total size (180K), or the simplicity of the documentation; this powerful set of tools makes Windows a dream to use.



**Simple Win's Applications Loader lets you select icons from multiple folders. Every folder contains up to 12 icons, each representing an application or another folder.**

do this while the Applications Loader is active—an important detail that's omitted from the documentation—since this will lock up Windows and force you to reboot your machine.

The third program, the File Manager, is a graphical file-system interface that includes a hierarchical directory display; it lets you view multiple directory windows to select, copy, and delete files and run programs. The File Manager uses icons to represent each disk drive and includes a Macintosh-like trash can icon for deleting files. Floppy disk drives are represented by icons that look like 3.5-inch disks, and logical hard drives are depicted by icons that resemble the front panel of a full-height Winchester drive. You can switch between drives by clicking the mouse on the appropriate icon.

The File Manager is vastly

mouse pointer, and drag the file to the other directory window. It's just as easy to copy a group of files: if you click inside the directory window, the File Manager will create an adjustable box. Then you can size the box to enclose the files and drag

**FACT FILE**

**Simple Win**  
Matesys, 2001 L St., #601,  
Washington, DC 20036; (202)  
785-5135.  
List Price: \$99  
Requires: Microsoft Windows  
2.03 or later (or Microsoft  
Windows 386).  
In Short: This fine program  
creates an easy-to-use, icon-  
based front end for Microsoft  
Windows. Its File Manager is a  
tool that no serious Windows  
user can live without.

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## First Looks

# DataFinder 4.0 Offers On-the-fly Access to Paradox or dBASE Files

HANDS ON  
by Richard Hale Shaw

If you need the power and functionality of most contemporary database management systems, you'll have to live with the fact that you just can't pop up a database file, look up or change a few records, and then pop out of it again. And unless you're using one of the few Microsoft Windows-based DBMSs, you can forget about using the cut-and-paste method to move data into other applications.

But dBASE and Paradox users now have a way around those obstacles. TSR Systems' *DataFinder* is a memory-resident program that lets you pop up a window onto a dBASE or Paradox database file, allowing you to find and view data in selected databases, edit existing records, and add new records while you're working in another application. (Separate versions of the program are available for dBASE and Paradox; each costs \$99.95.) Password protection prevents *DataFinder* from being used for unauthorized database access. The program, which also includes on-screen help and a powerful cut-and-paste facility, occupies 86K of RAM when it's loaded—not bad considering that it functions like a miniature DBMS.

Using operators like = and >=, *DataFinder* makes simple database searches easy (although you're limited to searching on one field at a time). You can search for records where the selected field matches up to six values; search for a match on a portion of the field; and control the exactness of the search and the case-sensitivity of the comparisons. *DataFinder* also includes a facility for finding related records in other tables, but it is crude compared with that found in a full-fledged DBMS.

The program offers two modes of operation: Table

mode, for viewing a database in a spreadsheet-like format, and Finder mode. The latter displays a single record at a time with the name, type, length, and contents of each field. With this screen, you can cut and paste

to copy a field, a record, or a group of records to a special *DataFinder* memory buffer. When you return to your previous application, you can press a *DataFinder* hotkey that causes the program to paste the data onto



The screenshot shows the 'DataFinder 4.0' window with a table of data. The table has columns for 'ID', 'NAME', 'ADDRESS', 'CITY', and 'STATE'. The data is as follows:

ID	NAME	ADDRESS	CITY	STATE
1	JOE	12345	NEW YORK	NY
2	JANE	67890	NEW YORK	NY
3	JOHN	12345	NEW YORK	NY
4	JANE	67890	NEW YORK	NY
5	JOHN	12345	NEW YORK	NY
6	JOHN	12345	NEW YORK	NY
7	JOHN	12345	NEW YORK	NY
8	JOHN	12345	NEW YORK	NY
9	JOHN	12345	NEW YORK	NY
10	JOHN	12345	NEW YORK	NY
11	JOHN	12345	NEW YORK	NY
12	JOHN	12345	NEW YORK	NY
13	JOHN	12345	NEW YORK	NY
14	JOHN	12345	NEW YORK	NY
15	JOHN	12345	NEW YORK	NY
16	JOHN	12345	NEW YORK	NY
17	JOHN	12345	NEW YORK	NY
18	JOHN	12345	NEW YORK	NY
19	JOHN	12345	NEW YORK	NY
20	JOHN	12345	NEW YORK	NY

*DataFinder's* Viewer screen lets you view database records and fields in a table format.

data, as well as find, modify, jump to, and page through database records. You can jump to either end of the database, add new records, or make copies of existing records with a keystroke. If you press the Right Arrow key after selecting a numeric field, *DataFinder* will compute the total, average, maximum, minimum, and standard deviation of that field for the entire database.

*DataFinder* supports full file and record locking, and you can run Paradox or dBASE against a file opened by *DataFinder* without conflicts or data corruption. While *DataFinder* won't cause Paradox to automatically update an on-screen record (the way another copy of Paradox would), it will safely lock and unlock the records as they are updated. Network versions of *DataFinder* are also available.

Cut-and-Paste is arguably *DataFinder's* most powerful feature. You can use this facility

the screen as if you'd entered it there yourself. Thus, you can move data from Paradox or dBASE files into a word processor, spreadsheet, or nearly any other program.

Another feature of the program lets you select fields and records and extract copies of them into a new database with a single keystroke (an alternate keystroke will additionally open and display the new database).

For all its merits, the program does have a few limitations. First, the Paradox version cannot access encrypted data tables; you'll have to decrypt them before you can use them with *DataFinder*. Since *DataFinder* does not update data indexes, you'll have to re-index a database after using *DataFinder* to change its index key fields or add new records to it.

The program's documentation is adequate, but the type is small and not always easy to read. In some cases, the text dif-

fers from or does not identify features of the product. For instance, many TSR programs slow down DOS commands like DIR while they watch for a hotkey press. *DataFinder* lets you use Alt-Minus and Alt-Plus to temporarily disable the hotkey, allowing your machine to operate at its usual speed. This is a nice feature—but it's not in the manual.

The program is easy to install, and a SETUP program lets you change the hotkeys and the screen mode and set the password and the default database. Unfortunately, you can't enter the full path to the latter, so you'll have to start *DataFinder* in the same directory or switch to the table later. In addition, *DataFinder* doesn't indicate when it's busy, which makes it especially confusing to use during some operations (like executing a find command on a large database). Also, the paste hotkey doesn't work with some of the allowed key assignments. According to TSR representatives, these problems are being fixed.

In all, *DataFinder* is a must for Paradox or dBASE users who want to access a database file without leaving another program. And if you need to cut and paste database data, or if on-the-fly database editing sounds attractive, you can't beat *DataFinder*.



## FACT FILE

### *DataFinder* 4.0

TSR Systems Inc., 1600B Main St., Port Jefferson, NY 11777; (516) 331-6336.

List Price: \$99.95 (Paradox or dBASE version).

**Requirements:** 256K RAM (uses 86K), floppy or hard disk drive, DOS 2.x or later.

**In Short:** A memory-resident database management tool that lets you view, edit, add, and extract records in dBASE III, dBASE III Plus, and Paradox database files. It also allows you to cut and paste from database files to other applications. *DataFinder* is easy to use and well behaved, but it suffers from weak documentation.

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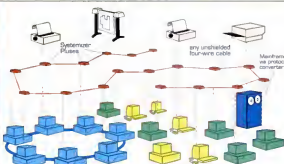
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## First Looks

# Quicken, Version 3, Offers Foolproof Check Writing, One-Step Funds Transfer Among Multiple Accounts

HANDS ON  
by Bill Howard

With Version 3 of *Quicken*, the best-selling check-writing and personal finance program, Intuit has supplied significantly more power and flexibility with a modest increase in complexity. For most users of personal finance software and for small businesses operated out of a checkbook and a petty cash fund, *Quicken*, Version 3, is the product of choice.

Version 3 (\$59.95 list and typically available for \$35 to \$45) seamlessly integrates multiple accounts and provides a slick method of transferring funds, such as moving \$2,500 from your money market account to your joint checking account. You can categorize expenses more thoroughly than you could with the previous version, and reconciliation has been markedly simplified. All of this makes personal book-keeping more sophisticated, and it further closes the gap with low-end accounting programs.

For the past several years, *Quicken* and *Andrew Tobias's Managing Your Money* from MECA Ventures have been the leading personal finance programs. *Quicken* has been cheaper, easier to use, free from copy protection, and more popular. For \$220, *MYM* provided more bells and whistles and correspondingly more complexity. If you wanted to calculate life insurance benefits or convert your \$55,000 salary to 1947 dollars, you used *MYM*.

But many users found themselves wallowing in the intricacies of *MYM*, especially if all they wanted to do was balance a checkbook. MECA last year released the checkbook feature as a separate \$50 product, *Checkwrite Plus*, but it's still

cumbersome. Version 2.0 of *Checkwrite Plus* claims to address ease-of-use concerns.

*Quicken*, Version 3, retains the basic visual metaphors of the program's 1984 first release: a PFS-like opening menu (licensed from Software Publishing Corp.), a blank check screen for writing checks, and a visual

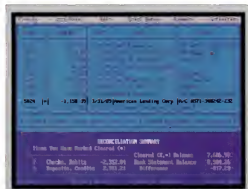
available: business-size voucher checks for laser printers and personal or wallet checks for tractor-feed printers only. You can order checks directly through Intuit; despite constant grumbling from users about the high cost, Intuit's charges are roughly in line: \$45 for 500 personalized tractor-feed or laser-printer checks.

The check register looks and works about the same as it did in the preceding version, except that there are now separate lines for Memo and Category. If you type the name of another *Quicken* account in brackets in the Category field, *Quicken* creates a parallel credit/debit transfer. *Quicken*'s other accounts can be additional checking accounts,

tracking of accounts payable and receivable, and you can roll up all of your accounts into a single cash flow statement. In addition to Categories, you can produce job/project reports using a Class descriptor. Class works much like *Quicken*'s Categories; it's typically used to apportion income or expenses by job, client, property, or project.

If you want, you can pay your bills electronically through *CheckFree Corp.*'s *CheckFree* program. It's \$9 a month for the first 20 payments (remote-printed checks or electronic funds transfers) and \$3 for every 10 additional payments. *CheckFree* cut the same deal with MECA for its fall upgrades of *CheckWrite Plus* and *Managing Your Money 6.0*. The MECA products incorporate the *CheckFree* code; in *Quicken*, unfortunately, it is a separate module with data export to *Quicken*.

*Quicken*'s flaws are few: You can create custom reports, but you can't save the report formats; there's confusion on the main menu between Accounts and Account Groups; and other products do a better job of recalling memorized list items. Home users won't use most of the business reports and may wish that they could be excoriated from the menus. But if you want to spend as little time as possible each month keeping your checkbook in order, *Quicken* does it best. ■



Checkbook reconciliation is far easier in *Quicken*, Version 3, since all uncleared items are shown on a single screen.

checkbook register for entering deposits and cash withdrawals. The program also comes in a special version for Tandy's *DeskMate* graphical environment, but Intuit has no immediate plans for an upgrade beyond Version 2.

When you're writing checks in *Quicken*, Version 3, the Categories field no longer occupies the Memo line on the check; you also don't have to precede a category name with the @ sign, and you can apportion each check's total among as many as 30 different Categories.

If you have a laser printer, you can print just one or two checks by feeding them sideways through the envelope slot. There are two new check types

cash, credit cards, business expenses, or other assets. If you set up a credit card account, *Quicken* lets you itemize only the important transactions and create a lump sum for everything else on the month's bill.

Reconciliation has taken the biggest step forward. Before, you had to leaf through multiple checkbook register screens to find uncleared items. Now uncleared entries are grouped on a single screen, one line per item. Tag cleared entries with the Spacebar, enter the bank statement's closing balance, and you're done.

If you're a business user, predefined *Quicken* reports provide income and profit-and-loss statements, balance sheets, and



## FACT FILE

*Quicken*, Version 3  
Intuit, 340 University Ave., Palo Alto, CA 94301; (415) 322-0573.

List Price: \$59.95 (upgrade from Version 2, \$29.95); *Quicken Transfer Utility*, \$19.95; *CheckFree* (optional electronic check writing), \$9 per month for 20 payments, \$3 for every 10 additional payments.

Requirements: 320K RAM, DOS 2.0 or later.  
In Short: The best personal and small-business finance program gets better in Version 3, especially for small businesses using cash-based accounting.

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**CIRCLE 162 ON READER SERVICE CARD**

## First Looks

# \$200 Algebra/Symbolic Manipulation Program Takes on Mathematica

HAZARD ON  
by Barry Simon

If you want the functionality that high-end mathematical software has to offer, you no longer have to shell out \$700 to \$3,000 for such a program and then surrender 6 to 10MB of disk space on a 386 machine. *Derive*, a \$200 program from SoftWarehouse, runs on a PC-XT without a coprocessor and performs a significant subset of the functions offered by programs like *Mathematica* and *Macysma*. And it executes them faster—occasionally dramatically faster—on the same hardware while offering a friendlier user interface.

To start with, *Derive* does exact integer and rational arithmetic, so if you tell it to compute 100!, it will display all 158 figures. The program will factor 15-digit integers with ease and will invert large matrices of rationals with aplomb. It does sophisticated computer algebra with rational and trigonometric functions. For example, I could get it to expand  $\sin(6x)$  or display the sum of the first  $n$  seventh powers as a factored polynomial in  $n$ , a problem that stumped *Mathematica*. In addition, the program offers numerous ways to adjust the format of the computer algebra output. For example, you can specify that powers of sine and cosine or multiple angles be used when expanding.

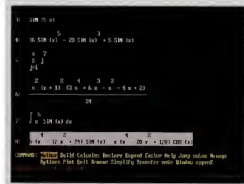
*Derive* does symbolic manipulation of calculus expressions, so it will take symbolic derivatives of arbitrary combinations of trigonometric, hyperbolic, and algebraic expressions and integrate most of them. For example, you can ask for the integral of  $x/(1+x)$  and get the answer  $x - \ln(x+1)$ . In addition to symbolic integration, the program does numeric calculations to a user-prescribed degree of accuracy. I had no trouble get-

ting it to display pi to 500 decimal places.

*Derive* understands vectors and matrices. You can define a matrix by explicitly entering its variables, or you can define a matrix with elements as a function of its indices. It will invert the matrix and find its determinant or the eigenvalues.

you to split the screen into multiple windows.

*Derive* does all of this with executable code of less than 220K without overlays. This is not only technically impressive but also allows the program to load fast, fit on a part of a floppy disk, and run on a TSR-laden machine with only 400K of free



*Derive* is equipped to handle many different types of computer algebra.

should be out by the time you read this.

*Derive's* lack of a programming language will probably make it unsuited to some high-end scientific applications. But if its minor limitations aren't serious to you, you'll find that this powerful little package is an absolute joy to use. Its low price makes it the algebra/symbolic manipulation program for the rest of us. If you were planning to use *Mathematica* as a justification for buying that 386 machine you've been eyeing, you'd better be sure that your boss doesn't find out about *Derive*.

The program has two- and three-dimensional graphics whose on-screen display and manipulation ability are comparable to the best programs that run on XT's. Graphics monitors through VGA are supported.

The program uses a *Micro-soft* Word-type menu. Output that scrolls off the screen can be scrolled back and recalled as input for commands. Output more than 80 columns wide is displayed on a single line that you can access by scrolling the screen left. I found this preferable to *Mathematica's* mode of wrapping lines, which causes fewer outputs to display on a single screen. If you prefer using a command-line interface, *Derive's* Author command will let you directly type in most commands. If you want to freeze some output on screen or view graphs and algebra at the same time, the program allows

memory. With more RAM available to it, the program can handle more-complex problems. It does not use EMS memory and will not use a coprocessor even if you have one.

This excellent program does have its limitations. Most significant, it lacks any kind of programming language. You can define your own functions, but there is no branching allowed in the definition and no recursive functions. You cannot define your own symbolic manipulation procedures as you can with a program like *Mathematica*.

Second, the program has no direct support for output of its graphs to a printer; you'll have to either use DOS graphics if you have a supported monitor/graphics combination or purchase a program like *Pizazz Plus* if you need to see hard copy.

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**PC**  
MAGAZINE  
**FACT FILE**

**Derive, Version 1.3**  
SoftWarehouse, 3615 Harding Ave., #505, Honolulu, HI 96816; (808) 734-5801.  
List Price: \$200  
Requires: 512K RAM, DOS 2.1 or later  
In Short: A low-cost algebra/symbolic manipulation program that offers an extensive subset of functions found in high-end mathematical software. A joy to use.

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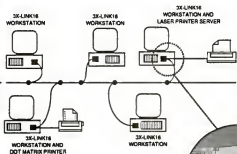
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## First Looks

### FastLock Keeps Sensitive Data Away from Prying Eyes

HANDS ON  
by Rock Miller

If encrypting your files one by one seems like too much trouble, *FastLock* from Rupp Corp. gives you a faster and easier way to keep them away from data snoops. Unlike most security programs, this \$69.95 program locks your entire hard disk, preventing anyone who doesn't know the proper password from accessing your desktop or laptop computer.

Using *FastLock* is simplicity itself. To lock up your computer, you simply specify a password up to six characters long; you don't have to concern yourself with options or command-line switches. When your system is powered up, it will insist on the password before continuing to boot. Three wrong passwords causes *FastLock* to sound a whooping alarm.

*FastLock* also logs the number (though not the times) of unsuccessful attempts, so that you can tell if anyone's been trying to get into your system in your

absence. If you forget your password, Rupp Corp. can decrypt it for you for a fee, provided that you're a registered user.

Once locked, our test disk proved quite resistant to the typical range of assaults that might be made on it. Booting from a floppy doesn't help—all that you get is an "Invalid drive specification" message if you try to change to any of the logical drives on the locked disk. This also means that you can't crack it with *The Norton Utilities* and similar programs, because they won't recognize that the drive is even there.

Let's the idea of modifying boot tracks and scrambling file allocation tables (which is how *FastLock* works) give you the cold sweats, be assured that the program is quite careful with your hard disk. It worked fine with a disk cache installed, and it makes backups of critical disk sectors, allowing the program to recover beautifully when we simulated a power failure in the middle of unlocking the disk. If the machine won't boot for

some reason, the company says, you can unlock the disk from a floppy.

*FastLock* does have a few limitations. You may not be able to lock your extra-large hard disk if it uses a special disk manager to expand the partitions beyond 32MB, because *FastLock* can't handle a file allocation table over 64K in size. And if you have more than one physical hard drive in your system, *FastLock* can lock only the one you boot from. But these shortcomings shouldn't present any real difficulties for most us-

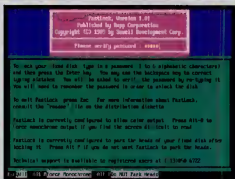
ers of the program.

*FastLock* won't secure your sensitive data if your machine falls into the hands of a determined and technically competent thief. But for everyday peace of mind, it offers much more than just nuisance value for your \$69.95. And its simplicity is the best possible insurance that you'll actually use it. ■

**List Price:** *FastLock*, \$69.95.

**Requires:** Hard disk, DOS 2.0 or later. Rupp Corp., 7285 Franklin Ave., Los Angeles, CA 90046; (213) 850-5394.

CIRCLE 481 ON READER SERVICE CARD



Once you've entered a password up to six characters long, *FastLock* secures your disk in seconds—and parks the heads as well.

### Hands-Off Tape Backup for Large NetWare Networks

HANDS ON  
by Paul Ferrill

Network managers looking for a reliable way to back up a large hard disk—and to avoid using a slew of 360K floppy disks in the process—may find a solution in Advanced Digital Information Corp.'s LANBacker 4000. You can program the ten-cartridge tape system to conveniently back up the files on your *NetWare* file server at any time of the day or night.

The \$5,995 LANBacker 4000 uses ten 60MB cartridges to supply 600MB of storage. The \$7,995 LANBacker 8000 uses ten 120MB cartridges for up to 1.2 gigabytes of storage. You can daisy-chain up to seven units together on an SCSI con-

nection to provide a whopping 8.4 gigabytes of on-line backup storage. And you don't have to dedicate a PC to the tape backup role on a full-time basis, since the LANBacker SCSI adapter doesn't interfere with normal PC operations.

The LANBacker series gains reliability through redundancy. Looking something like an old-fashioned jukebox when it runs, LANBacker uses a rack of tape cartridges, moved by a mechanical linkage, to provide megabytes of contiguous storage. A mechanical tray positions each tape cartridge and drops it into the tape slot. If one or more of the 3M data cartridges fails (they come with a lifetime guarantee), the system continues working with the remaining

available cartridges. And because the cartridges are reel-to-reel, they are not subject to the hazardous wear and tear that other data cartridges experience when tape is pulled out of their center.

Both LANBacker systems include menu-driven software, called *LAN Right*, for *NetWare* networks; *LAN Right* allows a network administrator to direct the system to automatically back up LANs on any schedule. You sort and select files using various criteria, including server name, volume name, the day of the week the files were created, and the status of the archive bit that indicates if the files were changed since the last backup. The program also lets you restore files by date or filename or

you can restore an entire system.

In addition, *LAN Right* copies Novell's special system files, and it keeps hidden files hidden even after they have been backed up and restored. Several tape backup products designed for networks lack these features. For network managers considering tape backup when 360K floppies aren't enough, LANBacker may be just the answer. ■

**List Price:** LANBacker 4000, \$5,995; LANBacker 8000, \$7,995. **Requires:** Novell's *NetWare* or *Advanced NetWare*. Advanced Digital Information Corp., 14737 NE 87th St., P.O. Box 2996, Redmond, WA 98073-2996; (800) 336-1233.

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CIRCLE 173 ON READER SERVICE CARD

by  
Alan Cohen

# New & Improved

News of Announced Products and Upgrades

## FormMapper Lets You Update Your Database by Hand

### NEW

Some people type relatively rapidly, but hunt-and-peck typists resent the change that the computer keyboard has imposed on their work habits. Now people who yearn for the days of pen and ink can use those preferred tools to update their databases.

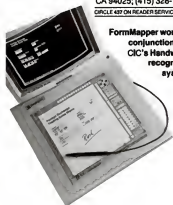
FormMapper uses Communication Intelligence Corp.'s Handwriter character recognition technology to facilitate handwritten updates to dBASE III or dBASE III Plus databases. Thus, when you use a pen to fill out a form resting on a digitizer tablet, the database is simultaneously updated. All handwritten entries appear to the computer as if they were entered from the keyboard. Furthermore, forms can be completed in any order, and corrections or changes can be made just by writing over the incorrect data.

FormMapper includes two programs to handle the form-filling and -mapping (to dBASE) functions. The package works in conjunction with CIC's Handwriter Data Entry System, which consists of a coprocessor card using a Motorola 68000 processor. Firmware on the card recognizes handwritten uppercase characters.

**List Price:** FormMapper, \$499; Handwriter Data Entry System, with digitizer tablet, \$1,279. Communication Intelligence Corp., 333 Ravenswood Ave., PM257, Menlo Park, CA 94025; (415) 328-1311.

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**FormMapper works in conjunction with CIC's Handwriter recognition system.**



### HOT PROSPECT

## THE ROAD WARRIOR SOLVES LAPTOP COMMUNICATIONS DILEMMAS

How many times have you and your laptop checked into a hotel room, only to discover that the hotel has a PBX with no dedicated data lines, or no modular jacks at all?

If it's happened one too many times, then look into the Road Warrior Toolkit from Computer Products Plus, a \$49.95 collection of tools to help make your portable office more hospitable.

The kit, which comes in a water-resistant nylon case, contains a combination slot-and-Phillips-head screwdriver, a pocket knife, a lighted magnifier, a modular "Y" connector, an in-line coupler, a cable with alligator clips, and a modular cable. It also has instructions to rig a connection in different situations.

A \$139.95 version adds the CP+ Connection, a module that lets you jack in to a digital PBX system. The CP+ Connection can also be purchased separately for \$99.

**List Price:** Road Warrior Toolkit, \$49.95; Deluxe Road Warrior Toolkit, \$139.95; CP+ Connection, \$99. Computer Products Plus, 1821 Wilshire Blvd., Santa Monica, CA 90403; (213) 829-5664.

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**The Deluxe Road Warrior Toolkit contains everything you need to hook your laptop's modem into any commercial phone system.**

## ExcelMore Shows More of Your Spreadsheet, Reduces Scrolling

### NEW

When it comes to "fun things to do on a PC," scrolling across a large spreadsheet ranks up there with formatting disks. Or watching CAD screens redraw.

Well, it won't format your disks, but Aristocad's \$99 utility ExcelMore can end your scrolling woes. Excel users with EGA or VGA cards can view twice as many columns in their worksheets and can reduce the amount of scrolling required by as much as 500 percent, according to the company.

The package includes two key features called Pan and Zoom. Pan allows users to roam around up to five times as much display area without having to use any of the dreaded scroll bars; ExcelMore loads all of the data and graphics into the memory on your video

card, rather than generating them on the fly. There is no redrawing involved, and the Pan feature enables Excel users to view multiple windows simultaneously.

Zoom, on the other hand, displays a worksheet with twice as many columns as an ordinary Excel display and can be toggled on and off with the press of a mouse button.

Included with the program is a collection of five display drivers: 1,024 by 1,024 portrait, monochrome; 2,048 by 512 landscape, monochrome; 1,024 by 512, color; 800 by 640, color; and 640 by 800, color.

**List Price:** ExcelMore, \$99. **Requires:** Microsoft Excel, Microsoft Windows/286, EGA or VGA card. Aristocad Inc., 1650 Centre Pointe Dr., Milpitas, CA 95035; (408) 946-2747.

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## New & Improved

# Local Union Speeds Shared Printers

### NEW

As children, most of us were taught what a wonderful thing it is to share. To share our Play-Doh or our G. I. Joe's. But as anyone who's ever had to meet a deadline can attest, sharing a laser printer is an entirely different story.

That's where Local Union, from LaserTools Corp., comes in. Local Union is a high-speed printer-sharing system that allows between four and eight PCs to share a single laser printer. According to the company, Local Union not only matches the pages-per-minute speed of a direct-connected printer, but often exceeds it.

Currently, there are two models of the system. Local Union 41 (\$595) enables four users to share a printer, while Local Union 81 (\$795) connects a maximum of eight users. Both models use high-speed parallel printer ports; each input port features proprietary receiver circuitry that allows parallel cabling over 100 feet long, according to the company.

Included with the package is LaserTools' software utility, *LaserTorq*, which is designed to speed up printing through the Local



Local Union 41 allows up to four users to share a laser printer through their computers' parallel ports.

Union system. *LaserTorq* and Local Union distribute buffering among the PCs, and printing is handled by the sharing hardware, so there is no speed degradation when multiple users print simultaneously.

The *LaserTorq* program also implements several types of data compression to enhance printing performance. Thus, owners of 512K LaserJet II and LaserJet Plus printers can print full-page graphics without having to add additional memory to the printer.

**List Price:** Local Union 41, \$595; Local Union 81, \$795. **Requires:** 21K RAM. LaserTools Corp., 5900 Hollis St., Suite G, Emeryville, CA 94608; (415) 420-8777.

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## GIGApack-LANsafe Backs Up 1.2GB on 4-mm. DAT

### NEW

The trend toward backing up larger and larger drives on smaller and smaller media continues to advance with the arrival of the GIGApack-LANsafe, a \$6,950 4-mm. DAT (digital audio tape) subsystem that's compatible with *NerWare*, Versions 2.x to 2.11. The drive writes to the tape in the Data DAT format using three-layer Reed-Solomon encoding for error correction.

In addition to the ability to store up to 1.2 gigabytes of data on a 0.4-by 2.9-by 2.1-inch cassette, GigaTrend's SCSI-based system features automatic head cleaning and a 20-second average random access time, according to the company. A library of all volumes is maintained on your hard disk, and you can password-protect individual tapes.

An LCD display on the front panel of the 5.25-inch form-factor unit shows the tape position, drive status, and results of built-in diagnostics. The GIGApack-LANsafe comes in both internal and external models.

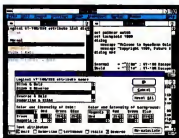
**List Price:** GIGApack-LANsafe, \$6,950. GigaTrend Inc., 2234 Rutherford Rd., P.O. Box 4298, Carlsbad, CA 92008; (619) 931-0122.

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### IMPROVED

**AdaptAsync**—Network Software Associates' new version of its AdaptAsync PC-to-host connectivity software supports IBM's ARTIC (A Real-time Interface Coprocessor) family of boards. Users who elect to use the ARTIC coprocessor do not have to use NSA's AdaptAsync plug-in board to configure the AdaptAsync Controller. The new AdaptAsync Control Program retails for \$795, but current AdaptAsync Control Program users can receive a free upgrade. Network Software Associates Inc., Laguna Hills, Calif.; (714) 768-4013.

**DynaComm, Version 2.0**—DynaComm, Future Soft Engineering's asynchronous communications package for Microsoft Windows, provides users with full network support, an updated interface, revised documentation, and enhancements to the program's script language. In all, Version 2.0 adds over 30 new communications functions to the original edition. Users can now remap the keyboard, control network parameters, govern how readily *DynaComm* yields control to other Windows applications, and call dynamic link libraries. Version 2.0 also includes several free utility programs written in *DynaComm*'s script language. The package retails for \$295, and registered owners of earlier versions of *DynaComm Asynchronous Edition* may upgrade to Version 2.0 for \$50. *DynaComm* is also available in a 3270 *Synchronous Edition*. Future Soft Engineering Inc., Houston, Tex.; (713) 496-9400.



*DynaComm* comes with several utilities written in the program's upgraded script language.

**BackLoader 2**—With *BackLoader 2*, an enhanced version of Roxolid Corp.'s *BackLoader 1*, HP LaserJet and DeskJet users need not worry about downloading soft fonts when running a specific application. *BackLoader 2* "watches" whatever program is printing; the package automatically downloads a soft font if one is not already installed in the printer. If the printer runs out of memory, *BackLoader 2* deletes the most recently used font to make room for the new one. It also deletes a typeface when the printer's font limit is reached. Furthermore, by pressing a hotkey, a *BackLoader 2* user can check the current status of the printer and fonts. The package, which requires 32K of RAM and DOS 2.0 or later, retails for \$89. *BackLoader 1* owners can receive the upgrade free of charge from the company. Roxolid Corp., Pleasant Hill, Calif.; (415) 256-0105.

**askSam, Version 4.2**—askSam Systems' information retrieval system now allows users to associate a graphics file with an askSam record, thereby making it possible to retrieve and display scanned images, captured video, and any other type of digitized graphical information. The enhanced release also offers the ability to run external DOS programs from within an askSam hypertext record and adds support for hypertext menu modifiers. All Version 4.2 purchasers will receive a free application disk that includes a wide variety of user-modifiable programs and utilities; a copy of CompuShow, a shareware

CONTINUES ON PAGE 56

REPORT CARD									
Multiuser Relational Databases									
	Advanced Revolution 1.1 (points/weight)	House IV Plus 1.1 \$695	House IV 1.0 \$795	Informix SQL- 2.0 \$795	Paradox 2.0 \$495	Paradox 3.0 \$725	House for Dos 2.0 \$725	Team- up 2.0 \$155	
Price (base/rough user)		\$550							
Performance									
Relational tests		Excellent	Poor	Poor	Very Good	Excellent	Excellent	Excellent	Very Good
Relational data entry	(50)	Excellent	Poor	Very Good	Very Good	Excellent	Excellent	Excellent	Excellent
Relational reporting	(75)	Excellent	Satisfactory	Good	Excellent	Excellent	Excellent	Excellent	Good
Relational querying	(50)	Excellent	Good	Very Good	Excellent	Very Good	Excellent	Excellent	Very Good
Programming language	(100)	Very Good	Good	Very Good	Satisfactory	Good	Good	Good	Poor
Speed tests	(50)	Satisfactory	Good	Very Good	Satisfactory	Good	Very Good	Satisfactory	Good
Standard operations	(75)	Good	Poor	Good	Excellent	Good	Satisfactory	Satisfactory	Good
Actual use modes	(75)	Very Good	Poor	Very Good	Excellent	Very Good	Excellent	Excellent	Very Good
Transaction model	(75)	Good	Good	Poor	Excellent	Excellent	Excellent	Excellent	Good
Documentation	(75)	Poor	Poor	Satisfactory	Very Good	Excellent	Excellent	Excellent	Very Good
Ease of learning	(50)					Excellent	Excellent	Excellent	Very Good
Ease of use						Excellent	Excellent	Excellent	Excellent
Basic	(75)	Poor	Satisfactory	Very Good	Satisfactory	Excellent	Excellent	Excellent	Good
Multiuser features	(50)	Very Good	Uncomparable	Poor	Excellent	Very Good	Very Good	Very Good	Poor
Error handling	(75)	Very Good	Poor			Excellent	Excellent	Excellent	Excellent
Support						Excellent	Excellent	Excellent	Excellent
Support services	(25)	Satisfactory	Good	Good	Poor	Good	Very Good	Very Good	Excellent
Technical support	(50)	Very Good	Very Good	Satisfactory	Very Good	Excellent	Excellent	Excellent	Excellent
Value	(50)	Good	Uncomparable	Good	Very Good	Excellent	Excellent	Excellent	Excellent
Total score		8.8	3.8	5.4	8.3	8.1	8.9	8.5	7.8

InfoWorld, April 10, 1989

# The bottom line is 8.9

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	Power Panel	Direct Access	Horizon Commander	Xtree
Automatic Menu Setup	yes	no	no	no
User Defined Help	yes	no	no	no
Telecom Services	yes	no	no	no
Desktop Accessories	yes	no	no	no
Mouse Support	yes	no	yes	no
File search by name and content	yes	no	no	no
Encrypt/decrypt files	yes	yes	no	no
Screen saver	yes	yes	no	no
All memory available to user application	yes	yes	no	no
Password Protection	yes	yes	yes	no
Utilized menus	yes	no	yes	no

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## New & Improved

### LaserTwin Gives Ink Jet Printers LaserJet Fonts

#### NEW

The font market has exploded, with literally  
thousands of soft fonts now available for laser  
printer users. Ink jet and dot matrix owners,  
however, haven't been quite so lucky. If they  
don't buy expensive cartridges, then the fonts  
that came with their printers are the fonts  
they're stuck with. Forever.

Well, if you can't beat them, join them  
with Metro Software's *LaserTwin*, a RAM-

resident utility that requires 29K and allows  
ink jet and dot matrix printers to fully emulate  
HP LaserJet Series II printers.

*LaserTwin* supplies all of the fonts and  
symbol sets built into the standard Series II; it  
also supports all HP-compatible download-  
able fonts from vendors such as Bitstream,  
Agfa Compugraphic, and HP itself. You can  
print in landscape orientation, and a spooler  
provided with the program speeds up back-  
ground printing.

Furthermore, *LaserTwin* makes it possible  
for offices and other sites with a combination  
of LaserJets and dot matrix printers to install  
and use a common LaserJet printer driver.  
List Price: *LaserTwin*, \$179. Requires: 29K  
RAM; HP DeskJet, Canon BJ-130, or dot  
matrix printer; hard disk; DOS 2.0 or later.  
Metro Software Inc., 2509 N. Campbell Ave.,  
#214, Tucson, AZ 85719; (800) 621-1137.

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#### IMPROVED

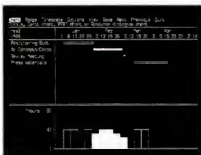
#### CONTINUED FROM PAGE 54

graphics program developed by Canyon State Systems/Software; sample graphics images that will  
run under Version 4.2; and askSam's Personal Impact Enhancement System, which supports large-  
scale database mail-merge programs. askSam, Version 4.2, retails for \$295; registered owners of  
Version 4.0 can receive the upgrade for \$45. Owners of Version 4.1 who purchased that package  
after May 1, 1989, are eligible to receive the upgrade free of charge. askSam Systems, Perry, Fla.;  
(800) 327-5728.

*Software Bridge*, Version 4.0—The latest release of the word processing file conversion program  
from Systems Compatibility Corp. features an automatic translation capability. The package can  
now determine which word processor created the files to be converted. The correct conversion  
process is then initiated. In addition, seven new word processing conversions have been added,  
including PFS:Write, PFS:Professional Writer, PFS:First Choice, IBM Writing Assistant, Smart-  
ware II, Total Word, and Standard and Intelligent ASCII. According to the company, conversion  
speed in the new release has been increased by an average of 200 percent. *Software Bridge*, Version  
4.0, retails for \$149; registered owners of any previous version can receive the upgrade for \$49.95.

A LAN Server Version for three  
users is also available, for \$295.  
Additional node licenses are \$69.  
Systems Compatibility Corp., Chi-  
cago, Ill.; (800) 333-1395.

*Project Calc/Resources*—Frontline  
Systems' *Project Calc/Resources*,  
an enhanced version of its *Project  
Calc* add-in for Lotus 1-2-3 and  
*Symphony*, adds project schedul-  
ing and resource management to  
1-2-3 spreadsheets. The package  
supports any number of named  
resources, which can be allocated  
across multiple projects. New dis-  
plays provide Gantt charts and  
histograms. The program supports  
Critical Path Method scheduling,  
resource-limited scheduling, and resource leveling. Each time the spreadsheet recalculates, the  
project schedule is automatically recomputed. Users can access costs, resource loading, or schedule  
dates in any spreadsheet using the new @ functions the program offers. *Project Calc/Resources*  
retails for \$279.95 and requires 640K RAM (EMS memory is recommended for *Symphony* users).  
A hard disk is strongly recommended. Owners of *Project Calc* can obtain the upgrade for \$100.  
Frontline Systems Inc., Palo Alto, Calif.; (415) 327-7297.



*Project Calc/Resources* displays Gantt, PERT,  
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## New & Improved

### GammaScript Sends High-Quality Faxes from GammaFax Board

NEW

While there's no doubting the convenience of PC fax boards, there's one aspect of a PC-originated fax that often, and understandably, troubles us—the low-quality output. Now, users of GammaFax fax boards can send presentation-quality faxes with *GammaScript*, a \$440 software package from *GammaLink Graphics Communications* that supports PostScript, HPGL, and AutoCAD formats.

The software translates the PostScript output from an application into a fax-format file. This file can then be transmitted by any GammaFax. The result is a fax that looks exactly as if it were printed on a 200-dot-per-inch PostScript printer.



**GammaScript lets you send DTP-quality faxes from within your PC.**

The PostScript interpreter itself is licensed from QMS, from whom add-on fonts will be available. Two versions of the software are currently available. The standard configuration includes 35 typefaces; an introductory package, *GammaScript Starter*, includes 13. **List Price:** *GammaScript*, \$440; *GammaScript Starter*, \$145 (upgrade to additional fonts, \$295). **Requires:** 80286-based machine with 1MB RAM, hard disk with 4MB free, GammaFax fax board. *GammaLink Graphics Communications*, 2452 Embarcadero Way, Palo Alto, CA 94303; (415) 856-7421.

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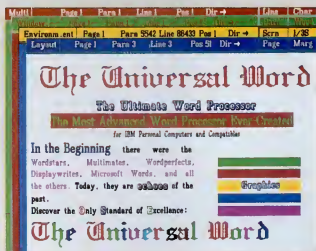
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Launch

# A new visio

Accidents happen.

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Central Point's vision is that a utility product should enhance your productivity every moment you're at your keyboard. It should do things like simplify the way you find, preview and load a 1-2-3 spreadsheet. Or, make it easy to combine the contents of one document into another. Even just allowing you to look up a dBASE record while you're in the middle of another application. Everyday tasks. Tasks that, without PC Tools Deluxe, are difficult to do and take way too much time.

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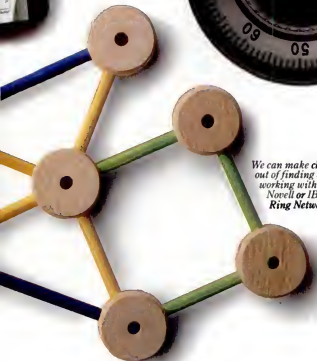


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# n of utilities.

dows, full mouse support, pull-down menus and context sensitive help make learning and using the product a breeze. And PC Tools Deluxe conforms to IBM's Systems Application Architecture (or SAA) standards so its look and feel will be quite similar to all the other applications you'll see in the 90s.

PC Tools Deluxe, it's a whole different approach to what a utility product should be. Designed not only to protect you from misfortune, but also with your broader needs and emerging standards in mind as well.

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CIRCLE 106 ON READER SERVICE CARD

by  
Gus Venditto

# Pipeline

*A Look at the Trends Shaping the Personal Computer Market*

## As Japanese Switch Factories to 1Mb RAM, Prices Drop in the U.S.

Although news that IBM was ramping up production of 4-megabit RAM chips was widely reported recently, the RAM trend with a more immediate impact is the switch from 256-kilobit to 1-megabit chips. Later this year, production of 1Mb chips will outpace 256-kilobit in Japan for the first time.

In April, the five top Japanese producers (NEC, Toshiba, Hitachi, Mitsubishi, and Oki) stamped out 32 million 256-kilobit and 23 million 1Mb chips; by fall, production of 256-kilobit chips is expected to drop below 30 million, while more than 32 million 1Mb chips will be made.

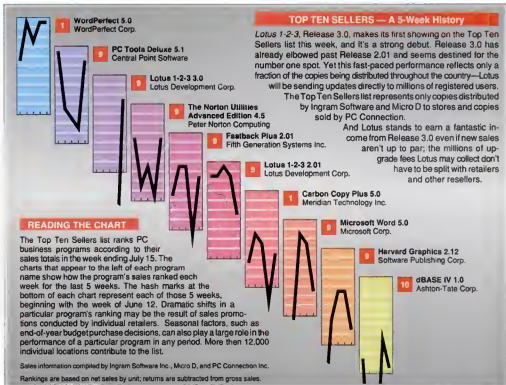
The Korean electronics giants are hiking RAM production, too, though on a far smaller scale. Hyundai, for example, has been making 50,000 1Mb chips a month recently and plans to increase that to 250,000 monthly by December.

Not that the Japanese plan to leave the 4Mb RAM market to Americans; Toshiba's Kyushu, Japan, factory plans to have its 4Mb production running at a 100,000-chip-

per-month rate by the end of the summer.

Of course, prices are a more compelling concern for most of us, and the news is good there, too. In the June 13, 1989, issue, I reported that retail prices of 100-nanosecond 1Mb DIP chips had fallen from \$38 to \$20 within 6 months. They've continued to fall and now sell for about \$15. 256-kilobit-chip prices have dropped, too, although at a lower rate—about 15 percent since the spring.

CONTINUES ON PAGE 64



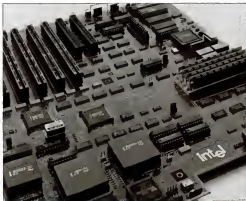
# Pipeline

CONTINUED FROM PAGE 53

## First EISA Chips Delivered

A key delivery was made in the industry-wide EISA project this summer. Intel delivered the first handful of the chips that will be at the heart of EISA-bus machines. The 82350 EISA chip set includes the 82357 integrated system peripheral (ISP), which provides DMA control, a timer/counter, interrupt control, bus arbitration, and DRAM refresh functions on a single chip. The EISA-bus master interface controller is also available for use on adapters, supplying arbitration for bus ownership with the main system processor.

At roughly the same time that the EISA chips were being delivered, Compaq finally reached an agreement with IBM to license Micro Channel technology; that doesn't mean Compaq will drop the EISA



One of the first working prototypes of an EISA system board. Intel has delivered the chips; can the systems be far behind?

project. But it's a clear indication that IBM realizes how important third-party development is to the success of IBM's products, and how vulnerable the company is in the face of the EISA alliance.

EISA machines will probably be debuted at the PC industry's annual convention, Comdex, this November.

## Signposts

A recent court ruling dealt Apple a major blow in its fight to force Hewlett-Packard and Microsoft to drop *Microsoft Windows* development; this clears the way for HP to finally bring *NewWave* to market. As if that news weren't bad enough for Apple, the company will soon have

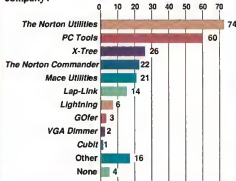
to contend with *WildCard*, a software emulator from Spinaker that will enable *HyperCard* stacks to run under *Windows*. . . . The GigaPack LAN Safe from GigaTrend in San Diego is the first PC storage device to use DAT (digital audio tape). The drive stores a full gigabyte on the same 4-mm. BASF tapes sold in audio stores for DAT drives. Aside from the concentrated storage potential, the GigaPack's major attraction is fast access to archived files. . . . In the April 25, 1989, issue, I discussed how Weitek's newest coprocessors could help optimize printers for graphics. Now Tektronix is using a RIPS (Raster Image Processor System) RISC board with a Weitek coprocessor in its 12-page-per-minute PostScript-workalike laser printer. Known as the L1212, the printer is based on a new Mita 300-dot-per-inch engine and sells for \$7,995. Look for a slew of 12-page-per-minute lasers soon, thanks to the Mita engine. ■



## SURVEY

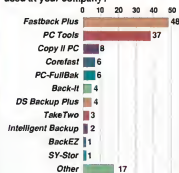
Our Top Ten Sellers list tells us which software utilities are selling well today, but we asked PC MagNet users to tell us which

Which of the following utilities are used at your company?



programs are actually used, day in and day out. Note that *PC Tools* is strong in both categories—general-purpose utilities and backup utilities.

Which of the following backup programs are used at your company?



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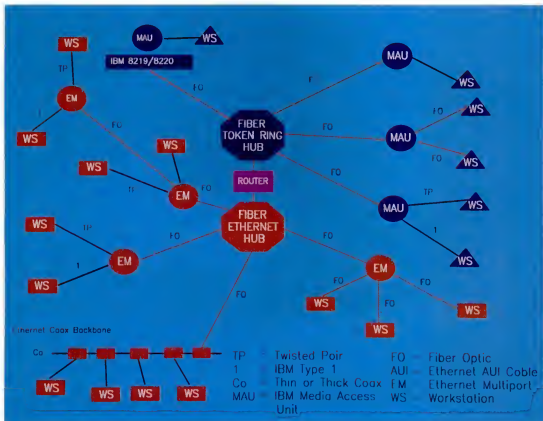
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# Bill Machrone



**Computer graphics  
are changing  
the face of business  
in many  
unexpected ways.  
A focus group  
gives us a glimpse  
of the future.**

Graphics is a grabber. A new generation of graphics professionals who have grown up with computers have adopted them for their daily work. From the boardroom to the playroom, their handiwork is evident.

Not so evident is the computer's role. Where once the origins of computer-generated artwork were painfully obvious, today the hardware and software have progressed to the point where the computer is transparent. The artist is no longer limited by the medium.

The medium is far from perfect, however. We recently convened a roomful of graphics professionals as a focus group in our New York offices. They came from a wide variety of financial, service, and industrial companies to talk with us and with product managers from Digital Research Inc. (DRI), one of the pioneering companies in PC graphics. DRI, you'll recall, makes the GEM graphics environment used by *Ventura Publisher* and other graphics applications, including DRI's own products. Our goal was to learn more about the ways in which power users applied graphics hardware and software.

First off, all agreed that internal presentations outnumber external by four or five to one. That makes sense when you consider the ever-changing data required to manage a company, in contrast with the greater consistency and focus required in presentations to outside groups.

The need to improve internal presentations has tended to bridge the long-standing gap between mainframers and PC jockeys. Several members of our group are responsible for presenting data culled from their companies' mainframe-based executive information systems, whose graphics capabilities fall short of top management's expectations. These people find it necessary to work closely with the EIS vendors and their own mainframe programming staffs, building the connectivity links and file import utilities needed to create the required graphics on PCs.

But even as the DTP crowd begins to build more cordial relationships with MIS departments, it is starting to discover a new adversary: the audiovisual department, which controls the glassed-in room at the back of the

boardroom. Our panelists told of abrasive encounters with these fiefdoms, which they feel are dedicated to protecting the "right" to stay up all night banging out presentations for the executive committee.

Other than sweeping organizational changes or clear mandates from above, our DTP professionals could recommend little to overcome the resistance they encountered from this quarter. One potential solution, they said, might be to use outside consultants to cut through big-company organizational baloney and get the job done. A few of our panelists are consultants or have worked for graphics production houses. They have often been brought in to manage projects that lay beyond the resources of in-house groups.

## HOT TOPICS

I was surprised by the attention that multimedia presentations garnered. The members of our group seemed well versed in what was



ILLUSTRATION: LISA HANLEY

possible with today's technology and had a clear idea of what they wanted to do down the road. Some wanted to mix full-motion television images with computer-generated graphics. Others wanted software that could produce and manage multiprojector slide shows. Still others wanted the PC to replace the 35mm projector entirely—they valued the ability to update or customize a presentation both quickly and inexpensively, while at the same time



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'Best Buy'  
July, 1989.

## Bill Machrone

producing overheads and other hard-copy output with speed and economy.

Several in our group described their experiments with animation. They noted that in the boardroom, executives seem to prefer the interactive quality of PC graphics projections to static 35mm slides.

Others are deeply involved in producing hyperdocuments, primarily for internal training. They're mixing images with text, scanning documents into databases, and building interactive applications. The Macintosh's HyperCard is an important authoring and access tool for these people. Unfortunately, the Mac's vaunted superiority in graphics doesn't count much for the majority whose companies are committed to PCs. That's frustrating to some, who are waiting impatiently for the next generation of PC graphics products.

## SPEAKING OF HARDWARE

This group really knew how to chew up their capital equipment budgets. 25- and 33-MHz 386 machines were the rule in the PC shops; fully loaded Mac IIs elsewhere. When you deal with bitmaps and color graphics, disk storage gets gobbled up like hot dogs at a picnic. Our group's machines typically had 300MB drives. Even the LaserWriter printers had 100MB of RAM for font storage.

Local area networks are critical to the success of corporate DTP and presentation graphics. Those multimegabyte files are tough to move around on floppy disks. Tape is too slow, and file consistency is always a vital concern. Most important of all, however, is the problem of ensuring against the possible use of outdated or unapproved images. So most of the group's members simply pipe the images they want into the conference room via the LAN. With fast LANs and low contention, some found that they could actually execute their presentations over the LAN.

Much as word processing has enriched secretarial jobs over the past decade, DTP is inexorably changing the way we work. Though at present DTP users have been limited by the need for artistic talent or aesthetic sense, better programs, templates, consultants, and internal standards are removing this barrier. In the process, secretaries are becoming administrative assistants and producing great-looking presentations for their departments.

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## PROJECT MANAGEMENT

**On competing in  
the boardroom...  
and the courtroom.**

Jeff Lindsey is a principal in Coppi-Lindsey Associates, an engineering firm outside of Washington, DC.

**On the state of the business:** These days, if you're in my business and you don't have a sophisticated computer capability with scheduling and graphics...you're not competitive. Period. It's that simple.

**On choosing Primavera Project Planner® (P3):®** Originally, I was using a mainframe package but I saw there was a trend toward the PC. So I started doing an analysis for the company of the packages that were out there...and I talked to friends...and the name that seemed to crop up the most was Primavera.

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# John C. Dvorak



**True multitasking means more computers, not more software. What happens if you have to reboot?**

The hokum that multitasking software represents dawned on me when IBM rolled out its first SAA offerings. Funny—I used to joke about it, but I've realized that true multitasking requires more than one computer to work properly.

My enlightenment occurred when IBM showed a movie in which various IBM users chatted about the greatness of the new IBM offerings. One guy was shown at a desk with at least 15 keyboards and monitors. I think he was trading currency or something. He'd reach over and poke at one keyboard, then another. And these weren't 15 micros, either, but 15 mainframes.

At a recent meeting in Washington, D.C., I talked about this observation with various mainframers and micro manager types, and everyone agreed that multitasking is best done on multiple machines. As I sit here and look at the 386 machine on which this column is being written, then over to my Mac II, where I keep most of my personal correspondence and where I do most of my OCR work, then at a computer on the floor dedicated to long uploads and downloads over a 9,600-bit-per-second modem, and finally, at my various game machines, I realize that this is what multitasking is all about. It's risk-free and it works.

Now this is the point at which people roll their eyes and say "Oh brother!" Nonsense! If you need to do two things at the same time, then you should have two computers, rather than risk the inevitable crashes that are par for the course with multitasking software. I used to say "one person, one computer." Now I say "one task, one computer."

The eyeball-rollers will say that this approach is too expensive. I say that if you need that much computer power, then you can afford multiple machines. Look at the guy with the 15 mainframes! Besides, getting an 8088 machine for downloads is cheaper than buying multitasking software!

If I have 4 megabytes' worth of files to download at 9,600 bps, how can I do it best? Should I do it as a background task in *Windows/386*? But then what happens to the download if I screw up some foreground task and have to reboot? Some systems, such as *VM/386*, will

let you reboot operating system segments individually. That sounds good until you lock up the keyboard and need to do a real system reset. We've all had this happen too many times not to know that this is unacceptable.

## **SPEAK NO EVIL**

Sure, if you're not doing anything critical, then sluggish, error-prone, software-based multitasking will work just fine. But real power users know that considerations of data integrity, performance, and reliability make "one task, one computer" the only practical option. It's just that nobody—not columnists, not pundits, not user groups, *nobody*—is willing to talk about it.

There is an unrealistic desire to believe that one computer can do everything. This notion comes from companies' trying to stretch their software sales by convincing users that single-machine multitasking is a good idea.

Naïve users think the idea sounds like a nifty



ILLUSTRATION: LISA HANEY

money saver. But I'd rather spend \$600 for an el cheapo Taiwanese clone for the sole purpose of doing uploads and downloads. Better still, you can upgrade your current machine and keep your old system for the modem. This solution gives you *true* multitasking on dedicated machines and also leaves you with a backup if the primary machine fails.

Think about that the next time you crash everything and have to reboot.

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# Inside Track

**Let the debate begin!** The big fight over the true speed of the Intel 486 has begun and will continue until PC Labs and real users get hold of a couple of machines. And it will probably start up again if Borland offers an optimizing compiler that maximizes the chip's unique parallel processing features.

For those of you who haven't been reading the trade weeklies and the newsletters, a speed argument has arisen, stemming from Intel's claims that the 486 gets twice (or more!) the throughput per clock cycle of the 386. Thus, a 33-MHz 486 machine should run at least twice as fast as a 33-MHz 386. This, they claim, is the result in part of a reduction in the so-called cycle time for many instructions and in part of a parallelism in the new chip's internal structure that allows it to do two things at once.

Intel's Bill Howe gave a speech in Japan, in which he said, "The 486 is a RISC processor with respect for its ancestors." Meaning, it's an optimized CISC chip, I guess. We'll call it the OCISC (optimized CISC) or the KRISC (kinda RISC) chip. I invite suggestions.

Whatever we call it, the critics are saying that the design doesn't lend itself to true optimization insofar as "real world" applications are concerned. Supposedly, when it comes to running *Lotus 1-2-3*, we won't see the theoretical speed. (I want one anyway!)

I'm reminded of the old NEC V-20, which, when announced, was supposed to be a souped-up 8088, but when tested with applications did nothing faster. I just got a letter from someone praising the chip as a cheap upgrade to his slow XT. This is obviously based on the fact that the popular Norton SI program (an unfortunately crude benchmark that Norton should either cease promoting or rewrite) reads 1.8 for the V-20, versus 1.0 for the 8088. However, the chip doesn't do anything faster when you use it in a system.

In the IBM booth at PC Expo, IBM had its proposed 486 machine running real-time video off of a hard disk pipelined through a 486. I said, "Gee, it almost looks as good as my \$199 analog TV receiver." (Aside: We'd better find a popular use besides word processing and spreadsheets for these speedy processors pretty soon, or we can expect the personal computer to freeze in its tracks.) Well, ever since they put a steering wheel, a gear shifter, and four wheels on a car, the changes haven't been too significant. Mostly window dressing. Maybe what we are seeing on the desktop isn't too different from what we'll be seeing in 20 years. Only 20 years from now, the machine will just rev faster.

**Genuinely Interesting Hardware Dept.:** While on the

subject of window dressing, a trend I'm always looking for is a computer of a different color.

At PC Expo there was an interesting Taiwanese machine from Pan Overseas Technology of Pine Brook, New Jersey. Dubbed the **POC Echo 386**, it was jet black with a keyboard that was black and green. The combination of colors on the keyboard looked better than it sounds. Anyway, this computer is genuinely interesting because it's the only machine I've seen that has a built-in **uninterruptible power supply**. In fact, when you power down, the machine will save the exact state of the machine at the time you hit the switch. This is a very handy feature if you have a roaming toddler who likes to switch off computers.

**Skin Them Alive Dept.:** Also at the show was a product I've been meaning to plug for years. It's the "keyskin," a thin plastic membrane cover for keyboards. For \$25.95, this simple and well-designed molded plastic film goes over most keyboards and protects them from dirty fingers, spilled liquids, and ambient dust.

You have to see one of these things to appreciate how great they are. The keyskin is a must for the computer in the garage or in the chemical processing plant. If you have a computer in any dangerous environment, it's ideal.

And you'd be surprised where danger lurks. Our associate publisher, Sam Huey, blew up his Zenith laptop on a coast-to-coast flight recently when a flight attendant dumped a cup of coffee onto the keyboard and short-circuited the thing. The airline offered him a free bottle of champagne as a "gosh, we're sorry" gesture. Sam, get one of these membranes! Then get a lawyer. They're from Compucover (the membranes, not the lawyers) in Fort Walton Beach, Florida. Call the company at (904) 862-4448. Highly recommended.

**Windows Dressing Dept.:** You haven't found much in this column in the way of *Windows* applications. There just haven't been that many interesting applications to recommend, as far as I'm concerned. But a Redmond, Washington, company (other than Microsoft) has some nifty *Windows* utilities that are worth checking out. The company is hDC Computer Corp. (telephone: (206) 885-5550). Get on its mailing list for information about its *Windows* tool kit, its superior executive replacement, and other upcoming software.

What impressed me most was hDC's pleasing *Windows Color*. This program lets you use a larger palette of colors for your *Windows* applications. It allows EGA users to use 16 colors from a 64-color palette, as opposed to Microsoft's 8-colors-from-8-colors non-option. It's pretty pathetic that we can deal only with these few colors. At least hDC gives us a little freedom for \$49.95.

We'd better find  
a use for these  
speedy processors  
soon, or the PC  
will freeze in  
its tracks.

Problems.

Problems.

Problems.

80386" desktops. They have awesome power, blinding speed, and unequalled expansion capabilities. There is, however, one important element missing—a handle. Making an excellent case for the NEC ProSpeed 386 modular PC. Engineered with all of the above and something quite extraordinary—an innovative Docking Station™ feature. No longer will you have to hook and unhook peripherals, phone lines or cables each time you leave the office. Simply slide the laptop out of the module and then simply slide out of your office.

**Answers.**



**Answers.**

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**Answers.**



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**NEC**



# Jim Seymour



**In all the hoopla  
about the new  
releases of Lotus  
1-2-3, don't forget  
one important  
point: Release 2.2  
means that  
add-in will live on.**

Lotus's decision to divide its customer base into haves and have-lesses by splitting its best-selling product, *1-2-3*, into high-end (Release 3.0) and low-end (Release 2.2) versions has attracted a good deal of attention.

The division-by-computing-platform strategy seems to make a lot of sense in the coolth of a Cambridge conference room, and Lotus executives, led by VP Frank King, have gotten very good at selling the notion. But it remains to be seen how well it matches customers' buying and working habits. Certainly Lotus's customers divide into those two groups. And soon there will be a third, even-higher-end group, using powerful 386 PCs with lots of memory and OS/2 with Presentation Manager, a crowd that Lotus plans to serve later with *1-2-3/G*.

But there are other issues at work here, too: self-image, for starters. Who wants to be labeled a "have-less," or worse, a "need-less," in the business world?

Apart from suggesting that (ego aside) you may not *need* the features that Release 3.0 adds to the functionality of Release 2.01, I want to point out that in at least one important sense, buyers of *1-2-3* Release 2.2 are going to form a privileged class. That's because they'll be able to go on using *1-2-3* add-ins, which will *not* work with Release 3.0, nor, for that matter, with *1-2-3/G* under OS/2 Presentation Manager.

Lotus can talk all it wants about the importance (maybe, someday) of the new LEAF method of allowing third-party developers to add functionality to Release 3.0. Sure, Lotus is putting more in Release 3.0 itself, so maybe some of the old-standby add-ins won't be so important to 3.0 users. Sure, some developers will port their add-ins over to LEAF and Release 3.0, and maybe they'll even develop new ones. And sure, once we're using OS/2 and several megabytes of memory, the multitasking nature of that operating system will mean that we can pop merrily around among so many concurrently running programs that *1-2-3* add-ins will become dim memories.

Someday. Sure. Uh-huh.

But we need answers that will work today. And today, a lot of *1-2-3* users—myself

included—rely on oddball toolkits of add-ins, and not always to fix what's wrong with Lotus's baby.

## A DO-IT-YOURSELF'S VIEW

A good example of this sort of do-it-yourself crafting of a highly customized *1-2-3* environment is reflected in a letter I received from a reader recently. Because so many of his biases match my own—we all think those who agree with us are geniuses, right?—I especially enjoyed Dick Moffat's letter.

Dick likes using add-ins, too, and isn't exactly heartbroken by what Lotus has done. Although he's impressed by Release 3.0, he too plans to stay with Release 2 for now.

As he says, "When put together, nearly all of the features of Release 3.0 are currently available in Release 2.01 add-ins, with the exception of 3-D spreadsheets and the ability to make 'monster' spreadsheets.

"The era of the 'monster' spreadsheet is



coming to an end, anyway, as users realize the limitations imposed by them. By using file linking, the distributed spreadsheet application is many times more efficient." And many times easier to design, debug, enter data into, maintain, and explain to others, I might add.

Dick and I both admire Personics Corp.'s *Look & Link*, which gives us 3-D-style spreadsheet linking. It's not as slick as Release 3.0's approach, but it's very usable.

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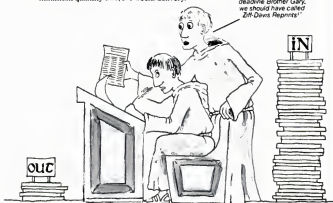
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## Jim Seymour

### THE CRAZY QUILT

The other big gain in Release 3.0 is its enhanced database functions.

Again, Dick and I both use *Informix Datasheet Add-In* with Release 2.01 for a lot of our work. I think *Datasheet* is far and away the most powerful, intelligently designed 1-2-3 add-in extant.

It does gobble memory: pack it into RAM along with DOS and 1-2-3 and you'll have less than 100K of memory left for your spreadsheets. Dick and I both use Qualitas's *386-to-the-Max* to help solve such memory problems by recapturing otherwise wasted RAM. Then we run the protected-mode version of *Datasheet* in extended memory—and thereby free up an enormous chunk of RAM for our worksheets.

But *Datasheet* has a lousy report writer, so when we want to format output from those *Datasheet*-managed files, we turn to yet another add-in, Symantec's *4Views*. I don't think much of *4Views*' database management capabilities, but its slick report writer happily massages *Datasheet*'s output into good-looking, easy-to-understand printed reports.

A fair response to that crazy-quilt list of add-ins would be that Moffat and I are crazy. We ought to find a single product that does what we need, to our satisfaction. Great! Find one. I never have.

*Microsoft Excel* is superb, for example, and I now use it more than 1-2-3. But like a few million other users, I work with a lot of people who still work with 1-2-3. And bringing files into *Excel*, then writing them back to a .WK1 file, gets tedious. So I still keep 1-2-3 and a handful of sneaky add-ins on my disk along with *Excel*.

I wrote here not long ago that users need to be hard-headed about upgrades. The new versions of 1-2-3 illustrate the point very well. I'm not saying that you shouldn't upgrade from Release 2.01 to Release 2.2. I remain excited by Release 3.0 and by the potential of 1-2-3/G. I don't dismiss them, and you shouldn't either.

But don't feel like a second-class citizen if you decide to stay with Release 2.2 rather than jumping to Release 3.0. Why trade your trusty 3-year-old Saab for a Winnebago, unless your needs have really changed that much? ■

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# William F. Zachmann



**Everyone knows that  
OS/2 will offer  
benefits beyond DOS.  
But it must first  
offer everything that  
DOS offers now.**

The transition from DOS to OS/2 has no real precedents. DOS has been the dominant operating system for personal computers since 1981—which means, in effect, that it has been the only significant one since microcomputers began to be used seriously in business.

For it wasn't until after the IBM PC and DOS were introduced that personal computers came to be used by a wide range of businesspeople, and it wasn't until mid-decade that they really caught on in a big way. Though Apple, Tandy, and various other brands of personal computers running CP/M were used in business to some extent before that, the number of PCs was relatively small and they were mostly in the hands of enthusiasts.

There have been certain parallels in the IBM mainframe world; the changeover from OS/MFT and MVT to OS/VS1 and VS2 in the early 1970s, for example, created a significant upheaval. But that transition was of concern strictly to information system professionals, not end users. By contrast, the DOS-to-OS/2 transition will eventually make an impact on nearly everyone who uses IBM-compatible PCs.

The biggest DOS upgrade since 1981 was the introduction of a structured file system in DOS 2.0. But this occurred while DOS was just catching on, and it was a minor change compared with the switch to OS/2.

## **FORWARD, NOT BACKWARD**

Because the transition to OS/2 is unprecedented in the PC world, this operating system's lack of immediate success is easily misunderstood. For OS/2 to achieve widespread acceptance, two requirements must be met. First of all, it must reliably provide all of the capabilities that are already available in the DOS world. Clearly, if migrating to OS/2 requires sacrificing what we already have, few will be willing to undertake that migration.

Second, OS/2 must provide additional capabilities that are sufficient to justify the expense and effort required to migrate to it and use it. Since OS/2 exacts a real penalty in the cost of the operating system and application software, the hardware upgrades that are required to run it, and above all the time that's

required to install and learn it, it must offer substantial benefits in order to offset these costs.

## **FEATURES ARE NOT BENEFITS**

Initially, OS/2 was seen primarily in terms of its additional capabilities, most notably multitasking, access to memory for applications beyond the 640K DOS limit, and the graphical user interface of the OS/2 Presentation Manager. But as we get closer to deciding whether, when, and why to use OS/2, this early focus starts to look amazingly naive.

It is now much easier to recognize these features as just that—features—rather than as the benefits they were automatically assumed to be 2½ years ago. As potentially useful as these features may be, it should be evident by now that they hardly constitute a sufficient reason to move to OS/2. Something more is necessary.

In the first place, OS/2 hardly has a monop-



oly on these features. Such competing products as *DESQview*, *VM/386*, *Concurrent DOS*, *Microsoft Windows*, *Phar Lap Software's 386/DOS-Extender*, the *LIM 4.0* expanded memory specification, *Unix* in its various forms, and a host of others are capable of delivering one or more of these capabilities today.

What's more, these features will give users genuine reasons for considering OS/2 only when the features are turned into concrete

## William F. Zachmann

benefits by application software, and we are just starting to reach that point.

But the most important factor of all has been overlooked: OS/2 must first match everything that DOS has offered in the past. OS/2's failure in this respect—not a lack of perceived future benefits—has

been the real inhibitor to its acceptance. OS/2 has lacked not potential advantages but essential capabilities, and this has kept it from taking off sooner.

Admittedly, OS/2 has taken a good deal longer to complete than anybody expected back in April 1987. IBM and Microsoft's "on-time" delivery of OS/2 1.1 at the end of 1988 was largely a symbolic act. In fact, the OS/2 1.1 releases (Standard Edition as well as IBM's Ex-

tended Edition) are *still* not entirely finished. Neither is a practical, usable product for the majority of users.

OS/2's lack of device drivers, the limitations of its still-primitive File System and Task Manager, and its DOS compatibility box, along with its inadequate performance, especially on 286-based systems, would have been sufficient to prevent its widespread use even if OS/2 applications were plentiful—which of course they are not.

The result is that OS/2 is still more promise than fulfillment. Nearly everyone underestimated how big a job OS/2 was going to be and how long the transition to OS/2 would take to get going. We're well behind where most observers claimed we would be by now.

Having been guilty of overoptimism, however, we should be careful not to err in

**The most important factor of all has been overlooked: OS/2 must first match everything that DOS has offered in the past.**

the opposite direction by underestimating how far we've come, and how quickly OS/2 will move along once it does get going. There may be some truth to the old saying that the darkest hour comes just before the dawn.

The two basic criteria for widespread acceptance are now closer than ever to being met, and the missing pieces are beginning to fall into place. Applications are starting to appear that really do make use of OS/2's capabilities, turning its features into real benefits.

Like an old-fashioned locomotive pulling a long train of cars, OS/2 hasn't exactly been off to a jackrabbit start. But like that old locomotive, once it starts rolling, it is likely to roll far and fast, and it will not be easily stopped by competing alternatives. I think I finally hear that train whistle blowin'!



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# Stephen Manes



**Is there a crisis in software quality?**

**Oh, come now—only a few troublemakers, such as users, really believe that.**

Let me assure you from the outset that there is actually no software quality crisis. The so-called crisis is clearly a specious notion propounded by a few nit-picking perennial naysayers. No one in the industry believes there is any call for alarm . . .

Now where were we before I exited my pop-up notepad and the word processor began cycling the filename display on and off? Oh, yes—no crisis in software quality. Industry experts assure us that current practices can maintain the highest levels of . . .

Sorry. For some reason, the display just kind of scrunched in half there. I wonder if it has anything to do with the suspect EMS driver or that flaky CD-ROM program? Let's see, we were talking about that mythical crisis invented by outside agitators (sometimes known as "users"), an utter fiction spawned by the unfortunate experiences of a few ax-grinding individuals.

Such as my building contractor, who recently discovered that *Dollars & Sense*, the accounting package that he's been using for 2 years to keep track of his business, has corrupted his files irretrievably. It took a while to figure out what was going on, he tells me, because the trouble—problems such as addresses mysteriously attaching themselves to the wrong names—manifested itself subtly and gradually. Eventually mail started coming back marked "Addressee Unknown."

The vendor's customer servants patiently explained that this kind of problem occurred only when someone tried to use the program for the third straight year. They pointed out that he was lucky that he hadn't tried the forecasting feature, which would have corrupted everything instantly. They sent him the latest version of the program, which supposedly fixes both problems.

But it doesn't fix them retroactively. As the update literature puts it, "This version will only prevent a reoccurrence of the string overflow error. Files that have been previously corrupted will continue to act accordingly." By the time he had shelled out for a day and a half of his bookkeeper's time to reconstruct and reenter information on every supplier, employee, and year-to-date financial transac-

tion, the contractor was using language more commonly heard after the application of a hammer to a thumb.

## A MINORITY OPINION

Perhaps such people believe there's a crisis in software quality, but they're clearly the minority—along with the contractor's colleague, who bought an accounting package primarily for its job-costing module. Once she switched her company's books to this program and entered a sizable number of transactions, she discovered that the program takes 10 minutes short of forever to perform even the simplest of tasks. The VAR who sold her the thing told her that the vendor informed him that the only way to improve the program's lethargic performance is—no doubt you've guessed—to eliminate the job-costing module.

Some carpers fault the classic product-development cycle. The people in Marketing, desperate for a product, ask the programmers



ILLUSTRATION: LISA HANEY

how soon it will be ready. Correctly sensing that Marketing won't accept an honest estimate, the programmers supply the most distant date they think Marketing will accept.

Marketing then plans its publicity, advertising, and distribution campaigns around this fictitious date. When that date departs without product, a "Ship or die!" mentality takes hold—and quality control goes out the porthole. To quote an acquaintance who's been

## Stephen Manes

working on a long-term project, "At this point, all we care about is getting the damned thing out the door."

Quality crisis? Readers of *Consumer Reports* understand that the software industry's policy of supplying surreptitious fixes only to those who complain is a time-honored technique derived from the most all-American of businesses, the automobile industry. And as that industry learned years ago, if people want staid dependability, they can look beyond our shores. After all, what keeps American business humming is planned obsolescence—a new model every year, bigger, sexier, more powerful. Rigorous quality control and dependable, rugged, long-lasting products? Better leave 'em to the Japanese.

A few grumblers actually maintain that software quality extends to more than the elimination of major and minor bugs. Claiming that software design remains an art and that software artists are few and far between, these malcontents scoff at programmers' suggestions that new operat-

ing systems will magically produce better software for users.

The skeptics point to what they see as curiosities in the workings of OS/2. In Version 1.1, for example, the File System program—a fancy tree-structured directory display—insists on wasting 10 seconds spinning the floppy disk drives every time it's invoked. A well-designed program, say these naysayers, wouldn't worry about the floppies until a user specifically requested information about them.

### UNDERMINING UNDERLINING

Another sore point with these Jeremiahs is the supposed ugliness of the underlined-letter method of displaying a selectable menu option in *Microsoft Windows* and OS/2. Is that an E or an underlined F? Sometimes it's hard to tell. And then there's OS/2's print spooler, disuse of which may be the best option.

Still another software quality issue is the question of whether the "pick 'n' click" icon-and-mouse user interface pioneered at Xerox PARC and popularized by Apple's Macintosh truly deserves to sweep every other interface under the doormat. Software infidels actually ques-

tion whether the aging PARC research, done with state-of-8-years-ago machines, truly laid to rest all other possibilities. They suggest that further inquiries might be useful before consigning every user in the universe to a lifetime of mousing around.

And at their most heretical, these renegades actually wonder whether system software itself could use some rethinking. Talk to anybody in the user-support trenches and you'll hear at least one horror story about the broken machine that "just won't work" because its owner has deleted or overwritten the hard disk copy of **COMMAND.COM**.

Yet the "advanced" OS/2 is no more protective of its most important files; accidentally delete its easily trashed **CONFIG.OS2** file and you'll get an incomprehensible error message the next time you try to boot the system. Shouldn't a modern operating system, particularly one as enormous as OS/2, at least warn its users (as the Macintosh sometimes does) when they're about to commit potentially disastrous errors?

Merely carping. As everybody knows, in reality there is no crisis at all. Software is as goo . . . ■

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# LANS:

PHOTOGRAPHY: ROBERT LORENZ

# The Software Is the Story

**PC Magazine evaluates  
LAN application software,  
examining the best in  
databases, accounting,  
e-mail, and groupware.  
Adding these products  
to your LAN can only  
increase your productivity.**

*by Frank J. Derfler, Jr.*

People who buy and install local area networks—as well as the magazines they read—tend to focus on the glitter and buzzwords of LANs. Products like 16-megabit-per-second Token-Ring and fiber-optic Ethernet adapters, SNA gateways, and 386 LAN operating systems draw our attention because they are tangible and new. We get involved with sharing laser printers and transferring files because these tasks offer immediate gratification and are easy to accomplish.

The challenge comes in designing and configuring the elements of the network to give many people simultaneous access to the same data files. Making simultaneous access available is the real payoff on the network investment. This is real information sharing.

In the most productive LAN installations, all of the sophisticated network and communications connections are put there only to transfer data for application programs. Typically, the connections get all the credit, and the applications are just expected to work.

This issue of *PC Magazine* focuses a strong light on the most important part of the network: LAN application software. Today's networked application programs seriously challenge packages running on minicomputers and main-

frames. In this issue our editors, supplemented by an expert staff from Price Waterhouse, evaluate

- eight accounting packages
- six multiuser databases
- nine group productivity programs, and
- eight electronic-mail systems.

The accounting and database benchmark testing conducted for the issue occupied over a month of activity at the PC LAN Labs in Florida. It involved the efforts of more than 30 company representatives, who were on hand to assist with testing difficulties and to help optimize their products for LAN performance, in addition to a large number of *PC Magazine* staff members.

The results of their work will point you toward programs that will yield a true payoff on your LAN hardware investment. For more information about inexpensive LAN hardware, see "Building Workgroup Solutions: Low-Cost LANS," *PC Magazine*, March 28, 1989. Some high-end solutions are described in the features "Building Workgroup Solutions: TCP/IP for Multiplatform Networking," June 27, 1989, and "Building Workgroup Solu-

tions: 3Com's 3+Open LAN Manager," February 28, 1989.

#### USING FILES

When you run a program that uses a data or text file on a standalone PC, the process is pretty simple. The application program opens the file, reads and writes data, and closes the file. This arrangement doesn't have to change when you connect your PC to a network and use a file server instead of your local disk to store files. You can arrange the data and text files on the file server in private subdirectories so that only one application program at a time uses them. But if you set things up for one-at-a-time file sharing, you miss out on using the real power and gaining the big benefit of the network.

The advantage of a network comes from letting many people get at and share the same files at the same time. Computerized accounting, inventory, reservation, order taking, directory, mail, scheduling, and management systems all rely on shared files. These kinds of programs fur-

nish the information and control needed to move products, people, and money around in the process we call commerce. They do "real work" for business.

Commercial programs that do real work are traditionally associated with mainframe and minicomputer environments. But our reports in this issue of *PC Magazine* prove conclusively that commercial application software running on PC-based LANs is now just as powerful, just as flexible, probably easier to use, and certainly less expensive than most products for real work that run on mainframes and minis.

#### CAN LANS REPLACE MINIS?

Yes, you can replace or avoid buying a mainframe or minicomputer system for accounting or database management by using a PC-based LAN. Yes, you can have complete confidence that the system will perform reliably, that it will be up to the task, that you will get support, and that you will keep your job.

Aside from the quality of the available application software, die-hard supporters of big-iron systems argue that PC-based

## SOLVING WORKGROUP PROBLEMS WITH A LAN

LAN software stands ready to help you use your network to improve productivity. Here are some typical problems that have effective LAN-based solutions. Each solution is accompanied by some important points to ponder.



**PROBLEM:**  
You need to share printers and files.

This is the basic function of a network operating system and the most popular reason for installing a LAN.

- ☐ You can attach up to five printers to a single server.
- ☐ The printer server can be located anywhere in the building (or on the campus).
- ☐ Costs range from \$300 to \$1,300 per node.
- ☐ Integrating DOS and non-DOS nodes can be tricky.
- ☐ Data switches offer a lower-cost, less software-intensive alternative.



**PROBLEM:**  
Scheduling meetings among busy people takes time and creates turmoil.

Workgroup productivity software takes the effort out of scheduling people and resources.

- ☐ These packages often include other valuable productivity utilities such as shared mailing lists and telephone directories.
- ☐ Rudimentary e-mail software is often included as part of workgroup productivity packages.
- ☐ Prices range from \$50 to \$200 per node.
- ☐ Scheduling software can only be effective when each person in the group keeps a personal calendar on-line and up to date.



**PROBLEM:**  
You'll have to install an expensive minicomputer for your bookkeeping department.

Not so fast. To keep track of all your payables and receivables, networked accounting packages provide the features and power of many minicomputer-based programs at a fraction of the cost.

- ☐ You can easily add more users to the network as the work load grows.
- ☐ Performance can equal that of a minicomputer-based system.
- ☐ A moderate-size network software system can cost less than \$2,500.
- ☐ Many PC-based programs provide hooks to mainframe information.

servers don't have the storage capacity or the ability to handle multiple simultaneous input/output requests present in mainframe systems.

Wrong. The server we used for testing accounting software in this issue was a Core ATomizer 386/25 capable of carrying slightly over 2.6 gigabytes of hard disk storage distributed on four drives. By the beginning of the year, those same drives will carry over 4 gigabytes. Modern network operating systems like Novell's *NetWare 386* use that space as contiguous storage.

When the long-awaited release of the Microsoft OS/2 operating system for the 386 arrives, *LAN Manager* network operating systems should have a similar ability to handle multigigabyte files across several hard disks. You can put a pretty big database in 2 to 4 gigabytes. The processor-equipped network adapter cards and the 25-MHz 386 CPUs in today's servers can handle a heavy load of network stations. The 486-based servers that will begin to arrive in the near future should coast along as they support hundreds of active stations.



**PROBLEM:**  
Telephone tag in your organization is getting worse.

Electronic mail eliminates the telephone tag problem and office memos as well.

- ☐ E-mail requires a critical mass of users to be effective.
- ☐ Its cost ranges from free (when included with the LAN software) to \$200 per node.
- ☐ Don't forget the hidden cost of assigning someone to administer the system.
- ☐ Many e-mail packages use a program called MHS (Message Handling Service) to transfer messages to and from PROFS, DISOSS, DEC's mail systems, and services like MCI Mail.
- ☐ E-mail systems for networked PCs are as good as or better than those on minicomputers.



**PROBLEM:**  
The amount of business you do through telephone orders is increasing dramatically.

Installing a networked database package is the first step toward automating the order-taking process.

- ☐ LAN database packages have internal application generators that create the database once you describe it on-screen.
- ☐ Packages vary in how well they handle certain types of searches and data update tasks.
- ☐ Overall, they perform at least as well as minicomputer software, and they cost less and are easier to use.
- ☐ Prices range from under \$1,000 to several thousand, depending on the size of the installation.

other applications that enter the file may and may not do (see the diagram "LAN Applications in Action").

An interesting twist comes from the fact that although the application software thinks it is sending requests to and receiving information from DOS, the redirection software running in every networked PC routes those messages to and from the network operating system that is probably emulating DOS. Novell's *NetWare* and Banyan's *VINES*, for example, understand the commands the application programs address to DOS and they reply, but between the request and the reply some very complex and non-DOS-like activities take place.

#### APPLICATION SOFTWARE

Writing highly efficient optimized network applications isn't easy. The deeper you get into the subject, the more it becomes an art and the less a science. Factors such as the size of the range of bytes an application requests from the server, how often data files are indexed, how logically search requests are written, and the internal architecture of the database software



**PROBLEM:**  
As your network grows, troubleshooting and control become more difficult.

You can manage your LAN without hiring more people with network management and control software, which automatically watches over network activity.

- ☐ The packages make it easy to configure networks and to monitor both network performance and usage.
- ☐ They work at the cable and access-control level and can record and report activity from all types of nodes.
- ☐ Preset alarms warn of failures, illegal operations, excessive packet collisions, and other events affecting LAN performance.
- ☐ Systems are relatively inexpensive, averaging a few hundred dollars per station.



## LAN APPLICATIONS IN ACTION

Application software running on a LAN works with the network operating system to keep data traffic flowing smoothly. On this LAN, spreadsheet, word processing, database, and electronic-mail software are all running together.

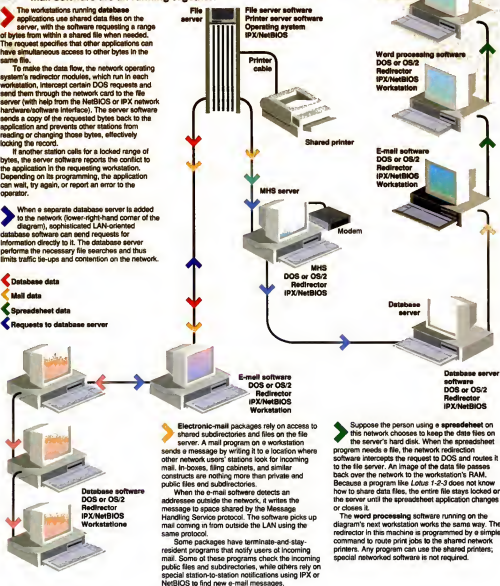
The workstations running database applications use shared data files on the server, with the software requesting a range of bytes from within a shared file when needed. The request specifies that other applications can have simultaneous access to other bytes in the same file.

To make the data flow, the network operating system's redirector modules, which run in each workstation, intercept certain DOS requests and send them through the network card to the file server (with help from the NetBIOS or IPX network hardware/software interface). The server software sends a copy of the requested bytes back to the application and prevents other stations from reading or changing those bytes, effectively locking the record.

If another station calls for a locked range of bytes, the server software reports the conflict to the application in the requesting workstation. Depending on its programming, the application can wait, try again, or report an error to the operator.

When a separate database server is added to the network (lower-right-hand corner of the diagram), sophisticated LAN-oriented database software can send requests for information directly to it. The database server performs the necessary file searches and thus limits traffic tie-ups and contention on the network.

- Database data
- Mail data
- Spreadsheet data
- Requests to database server



Electronic-mail packages rely on access to shared subdirectories and files on the file server. A mail program on a workstation sends a message by writing it to a location where other network users' stations look for incoming mail. In-boxes, filing cabinets, and similar constructs are nothing more than private and public files and subdirectories.

When the e-mail software detects an addressee outside the network, it writes the message to space shared by the Message Handling Service protocol. The software picks up mail coming in from outside the LAN using the same protocol.

Some packages have terminate-and-stay-resident programs that notify users of incoming mail. Some of these programs check the incoming public files and subdirectories, while others rely on special station-to-station notifications using IPX or NetBIOS to find new e-mail messages.

Suppose the person using a spreadsheet on this network chooses to keep the data files on the server's hard disk. When the spreadsheet program needs a file, the network redirector software intercepts the request to DOS and routes it to the file server. An image of the data file passes back over the network to the workstation's RAM. Because a program like Lotus 1-2-3 does not know how to share data files, the entire file stays locked on the server until the spreadsheet application changes or closes it.

The word processing software running on the diagram's next workstation works the same way. The redirector in this machine is programmed by a simple command to route print jobs to the shared network printers. Any program can use the shared printers; special networked software is not required.



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significantly affect performance, network overhead, and flexibility.

However, the database packages reviewed in this issue offer enough assistance so that the average reader of *PC Magazine* can create and run good multi-user applications. As your experience grows, so will the sophistication and efficiency of the applications you create.

Modern accounting and electronic-mail packages run on the same principle as database programs. The accounting packages contain excellent tools for manipulating the numbers and labels in data files. They

**There is no  
mystery to using  
application programs  
on a LAN.  
The packages we  
review give you a  
lot of help.**

cross-reference files and create reports based on sorting and math functions. The mail packages contain tools for creating, reading, and writing text files. They have few capabilities for producing reports like database or accounting programs, but they have significant capabilities for putting files in the right place (they call it delivering mail) with little guidance.

Not hard, just different . . .

There is no mystery to creating and using application programs on local area networks. The end users of networked applications don't need special knowledge or training to use them on the LAN. The people who install accounting, database, e-mail, and workgroup productivity packages and use them to improve group productivity must understand the concept of how programs share data, but the packages we review in this issue give you a lot of help. Networked application programs use the links that LAN hardware systems set up to do the real work of your business or organization.

*Frank J. Derfler, Jr., is workgroup systems editor of PC Magazine.*



## THE READERS REPORT ON LANs

Nearly 500 people responded to a recent PC MagNet survey on LAN hardware and software issues. A full 82 percent of them have at least one LAN operating in their company or organization, and 92 percent of that group are using one personally; these LAN users answered further questions on their equipment and applications. Among those surveyed who are not currently linked to a LAN at all, over half expect this to change within a year.

Note that 60 percent of the active users report that their LANs consist primarily of 286 machines. Clearly, LAN designers have moved beyond 8088-based workstations in pursuit of greater processing power.

While the operating system market is dominated by Novell's

NetWare and the electronic mail market by NetWare Mail, other products made a respectable showing. Among the most-frequent write-in responses (under "Other") was Artisoft's LANtastic; this \$199-per-node network operating system was a recent *PC Magazine* Editor's Choice ("Building Workgroup Solutions: Low-Cost LANs," March 28, 1989). Likewise, *WordPerfect Office* (reviewed in this issue) proved surprisingly popular in the electronic mail category, surpassing both *The Network Courier* and *Higgins Mail*.

Our survey also revealed the most popular applications for LANs today: database management, accounting, interoffice communication via e-mail, peripheral sharing, group document processing, a gateway to mainframes, and software development, in that order.

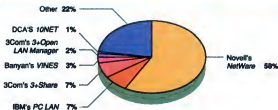
Are there currently any Local Area Networks (LANs) in operation at your company/organization?



If so, do you personally use a LAN at your company/organization?



Which network operating system do you use?

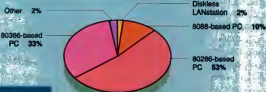




How many stations are there on your LAN?



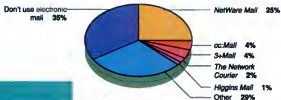
What type of station do you work on?



What are the majority of stations on your LAN?



What electronic mail package do you use on your LAN?



What percentage of your computing involves LAN-specific applications directly?



If you're not on a LAN at your company/organization now, when do you expect to be on a LAN?



# LAN's Best Friend

Dependable UPS systems from American Power Conversion support the UPS monitoring functions of:

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- Banyan Vines

\* EDITOR'S CHOICE 9/15/86



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|---------|--|
| 110SE   | Miniature UPS for Macintosh SE or PLUS               |
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| 450AT   | For Compaq 386, MAC II, and CAD workstations         |
| 520ES*  | For NetWare, VINES, and 3-COM file servers           |
| 800RT*  | For large file servers with multiple hard drives     |
| 1200VX* | For multiple PC's or very long backup power duration |

\*These models provide interface for use with optional interface kits.

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## MULTIUSER DATABASES:

## The Art of Simultaneous Access



PHOTO ILLUSTRATION: JAMES NAZZ

Just how well do  
databases with  
multiuser functionality  
stand up to the  
contention inherent in  
LAN environments?

We tested *Clarion*,  
*DataEase*, *dBASE IV*, *dBXL*,  
*Paradox*, and  
*R:BASE* to find out.

by Alfred Poor

Life in a small town can be tough; everyone knows everything about everybody else. You can't help but get in other people's way from time to time, and it takes a lot of work to keep things running smoothly. In short, it's a lot like multiuser database applications running on a local area network.

In the following pages, you will find the results of the most ambitious testing of major LAN DBMS (database management system) programs yet attempted by any publication. For our tests, the field was limited to programable relational databases that also offer thorough and friendly front ends. Six of the top packages that met that criterion—*Clarion Professional Developer* from Clarion Software Corp., *DataEase* from DataEase International, *dBASE IV Developer's Edition* from Ashton-Tate, *dBXL/LAN* from Wordtech Systems, *Paradox 3.0* from Borland International, and *R:BASE for DOS* from Micro-*rim*—were brought to the PC LAN Labs for a serious side-by-side workout. Two, *Clarion* and *DataEase LAN*,

had been selected as Editor's Choices earlier ("Same Time, Same File: Programmable Databases for LANs," *PC Magazine*, November 15, 1988). Fox Software was also invited to submit *FoxBASE Plus/LAN* but declined, citing lack of programmer time to create the code required to run our benchmark tests.

There were several leading packages that did not fully meet our requirements for this evaluation, even though they are fine products. Symantec Corp.'s *Q&A*, for example, is not a fully programmable relational database, but it is certainly powerful enough to run well on medium-sized networks and may be easier to install. It won a 1988 *PC Magazine* Technical Excellence Award. Another package, *Professional Oracle*, is interesting for its transportability across platforms but is not really end-user-oriented. For more about these and other database programs see "Databases for OS/2: The First Wave" (June 13, 1989) and "Project Database 3" (April 12, April 26, and May 17, 1988).

#### WHAT CAN YOU EXPECT?

In studying the features of these programs and evaluating their performance, it's important to ask one question: Just what can you reasonably expect from a LAN DBMS package?

One important area to evaluate is the user interface. All six programs in our test have "friendly" faces that suit novice users, as well as experienced users who want to get an application up and running quickly. For relatively simple applications, such as creating a multiuser mailing list or a job-tracking system, you should be able to get by without any programming at all. (By programming, we mean the creation of complex procedure files that are substantially different from the procedures offered by the basic menu choices.)

If your application needs are more complex, however, you do need to enter the arcane world of programming. Real-world applications are filled with exceptions to

rules, strange posting requirements for certain situations, and truly weird reporting requirements that cannot be handled by plain-vanilla data-entry and report-writing capabilities. You need to roll up your sleeves and control the program's actions, step by step, field by field, record by record, until you have sifted, sorted, and processed the data to meet your needs.

All of the programs tested here are capable of most of these complex tasks. But as you will see, for some tasks certain packages are easier to use than others are.

#### THE IMPORTANCE OF LOCKS

File and record locks are one of the major stumbling blocks you will encounter when programming with these packages. Each program seems to handle these differently, and most offer more than one approach.

By definition, a multiuser program must manage simultaneous requests for information from many users. Inevitably there will be times when two or more users want to get at the same information. Say,

## SQL: THE DBMS LANGUAGE OF THE FUTURE

by Lee Thé

As mainstream PC-based database vendors release new versions of their established products, a revolution is going on behind the scenes. That revolution is called SQL—IBM's Structured Query Language, a database sublanguage that IBM released into the public domain before personal computers existed.

SQL grew to become the *dBASE* of mainframe- and mini-based databases, running on systems such as IBM's DB2 mainframe and Oracle's VAX and Unix products. Now SQL is taking over the high end of PC-based database applications, and for good reasons.

With SQL, your database can talk to larger systems. You can prototype large-system applications on PCs. You can develop database systems running on a variety of platforms and operating systems, all talking to one another transparently—at least with some SQL products. And you can run SQL-based applications on PCs, singly and on LANs.

*PC Magazine's* May 17, 1988, issue reported on a group of such products: *Informix-SQL*, *Ingres* for PCs, *Professional Oracle*, *Unify RDBMS*, and *XDB-SQL* ("SQL: An Emerging Data-

base Standard for PCs"). None of these packages has received major revisions since then.

#### THE BIG REASON

The most important reason for getting an SQL database is to develop client-server applications on LANs. A client-

server architecture distributes database functions. The database itself goes in the server, and the client part goes in workstations, providing the user interface to the database system. That interface could in some cases look like the database you now use. A client can support data analysis and/or on-line transaction processing, passing requests for data and commit and rollback procedures to the server.

Client-server architecture speeds processing greatly, since the heavy data-crunching can go on in a powerful server, and only needed data goes down the wire to the client.

Several database servers for PCs are currently shipping: Ashton-Tate/Microsoft/Sybase's *SQL Server* (\$2,495), Gupta's *SQLBase* (\$2,995; single-user starter kit, \$1,295), Novell's *NetWare SQL* (\$595), and XDB Systems' *XDB-SQL* (\$1,995). Others on the way include IBM's *OS/2 Extended Edition Database Manager* and Oracle *Server Professional Oracle 5.1B*, a DOS product, can be used today to develop server-based applications for Oracle's Unix server.

Database servers will allow LANs to run applications that formerly mandat-

No one setting up  
a multiuser database  
management  
system these days  
can afford to ignore  
the industry's  
inexorable move-  
ment toward  
the SQL standard.

for example, that two users access the same address record; while one changes the name, the other changes the ZIP code. Without multiuser management, the first user might update the record first, but the changed name would be lost when the second user updates the record with the new ZIP code but the old name.

Locks are used to prevent this sort of problem. Programs typically lock data tables at either the file or the record level. The locks can be set up as either automatic or manual.

Some locks are nonnegotiable. For example, when you are rebuilding an index on a table, you usually cannot allow other workstations to change records at the same time and still end up with a valid index. Therefore, many programs automatically lock the entire data file when rebuilding an index; all other users are prevented from gaining access to the data until the update is complete. Automatic file locks are often found with other procedures, such as packing a file to remove deleted records.

ed a mini or even a mainframe. And the client-server model means that new versions of spreadsheets such as Ashton-Tate's *Framework III* and *Microsoft Excel* will be competing with database products for the client role in decision-support applications. For on-line transaction processing, however, you will still need to use local databases as front ends.

Some of the more-advanced servers, such as *SQL Server* by Ashton-Tate, incorporate further advantages, including stored procedures and triggers.

Stored procedures—the ability to store and execute macros in the server—can reduce LAN traffic and speed up client-server communications.

All servers foster heightened security by allowing you to put the database itself in a single, secure location. Servers with triggers can also enforce database integrity and business rules. Triggers are stored procedures invoked by internal or external events rather than by direct or programmatic command. Thus, you could automatically prevent an operator from deleting customers with open items in their accounts. Triggers can't substitute for building integ-

CONTINUES



## HOW SQL CUTS DOWN LAN TRAFFIC

In this diagram, a typical multitable query is described step by step on the left. The ways these steps are performed by a traditional workstation and file server versus an SQL-based client and database server are compared in the two columns on the right. The arrows indicate

relative amounts of LAN traffic generated between the stations and the servers. It's clear that the main advantage of SQL is its ability to isolate heavy processing at the dedicated server, freeing up the client stations and vastly reducing overall network traffic.



Many programs now issue automatic locks at the record level, as well. This feature is most often associated with menu-driven modes but can also be part of programming environments. Record locking prevents a user from making changes without having the most recent version of the record. One excellent feature that has started to appear in many of these programs is an automatic screen refresh that occurs when the record on your screen has been changed by another workstation on the network that has accessed the file.

In many cases, especially when you are programming your own procedure files, you can turn off most of the automatic locking features and place your own "manual" locks where needed. These are often required if you are calling data from many tables and need a way to prevent an impasse when two stations each want a piece of data that the other already has locked. Without some custom programming, the two stations might wait forever in a permanent standoff.

Some of these packages use features built into DOS or the network operating system to handle locks. Others create temporary files so that workstations can

All of these products work fairly well on straightforward tasks, especially when you are using their menu-driven front ends.

"leave messages" for each other about which records they have in use. Some programs also have more-sophisticated locking systems that prevent any one user from locking a record and then going out to lunch, thus holding up everyone else who might need access to that record.

## TESTING COMPLICATIONS

We asked the vendors to put our benchmark-test procedure code into their packages and to send a technical representative to be on hand during the testing. Even with the technical representatives on-site, no program ran the test procedures correctly right off the bat. This was partially the result of some last-minute changes we made in the test procedures, but that cannot adequately explain all the problems we encountered.

What does this experience mean for you, the prospective user? A couple of conclusions can be drawn. In the first place, all of these products work fairly well on straightforward tasks, especially when you are using their menu-driven front ends. The problems arise when you start to perform more-complex tasks with shared tables and records, especially when the tasks exercise a certain aspect of the program to a great degree. Typical problem areas include indexes (many different indexes open at one time, or lengthy keys with lots of calculations), multiple-table management on data entry screens (lots of lookup and transaction item detail), and complex processing, such as transaction

## CONTINUED

ity provisions and business rules into each application because triggers don't take the place of data validation on entry. But they do provide a second line of defense.

Of course, applications that utilize *SQL Server* extensions such as stored procedures and triggers become incompatible with other vendors' SQLs. ANSI's rudimentary SQL specification can provide only a subset of any standard that evolves. IBM's *DB2 SQL* offers a more complete standard, but it concentrates on helping you query mainframe databases rather than providing a complete set of database functions. Every vendor must either extend SQL to make a complete database product or leave it up to programmers to add what's needed—usually in C—as *Oracle* does currently.

## THE NEW STANDARD

*SQL Server's* added functionality may inspire users to make it the new standard, but its first release doesn't support multiple servers transparently. It needs this kind of scalability—and more of a

front end than C provides—before it can aspire to consideration as a standard. And keep in mind that the version of SQL that wins out in the long run will be decided by the buyers, not by a standards committee.

Most SQL front ends still require you to do queries in SQL, or perhaps a third-generation language such as C, if you want to develop turnkey applications. At present, *SQL Server* still lacks any kind of front end, though *Paradox*, *dBASE IV*, and others will come in *SQL Server* upgrades at some point. For now, though, you must embed SQL commands in C programs to produce applications.

Gupta's *SQLBase* comes with a point-and-shoot front end called *SQLWindows*—the closest thing yet to a front end that doesn't mandate programming. It suffices for developing simple applications and even includes a code generator called *SQLExpress*. While *SQLWindows* does qualify as a user front end, it's still more a tool kit for the SQL-conversant developer. You'll have to wait until 1990 for the true user product. Still, its graphical in-

terface and graphical-applications development capability stand out.

*SQL Server* may provide a more sophisticated engine, but every promised front end for it is still character based. Microrim has been showing early alpha versions of a graphical SQL-based database currently called *Atlas*, but no one knows when it will be released. Microsoft is also rumored to have a graphical front end that's code-named *Omega*, but it could be years away.

Novell sells a programmers' tool for *NetWare SQL* called *XQL 2.01* (\$795). And XDB makes *XDB-SQL* (\$595), also for programmers, which works with *XDB-Server*. It provides a tutorial and a lot of on-line help for those wishing to become SQL programmers. *Oracle* also provides a tutorial, but as a separate purchase.

All of these front ends are designed to work with the companies' own database servers. For multiproduct front ends, read the accompanying reviews of *Paradox*, *DataEase*, and *dBASE IV* for information about announced but as-yet-unshipped SQL upgrades. IBM has also promised a *PC-Focus* tool kit

## Clarion Professional Developer

by Catherine D. Miller

posting, that affects multiple tables. From what we saw, isolating and fixing the problems that can occur is not a trivial task, even for an expert.

Perhaps more important is that the programming itself can be extremely difficult. Witness the fact that we encountered problems in benchmark testing even though the program code was written and maintained by individuals selected by the vendors themselves.

As you read the following reviews, try to keep a clear image of your needs in mind. If you want easy multiuser access to simple tables of information, almost any one of these six will probably suit you—just pick the ones that are easiest to set up and use. More-serious consideration is warranted if you need complex procedures. How hard is it to code in these programs? What flukes and gotchas lurk in the dark? Can you reasonably expect to get an application running without making a life-long career of the project?

Multiuser DBMS programs have clearly gotten better in recent years. But as proved by the following evaluations (based on long hours in PC LAN Labs), there may still be a long way to go.

for *SQL Server* this fall. However, this release will support *SQL Server*-stored procedures and triggers.

You'll be tempted to look for an SQL-speaking iteration of a familiar database to use as a front end. *Paradox* shares SQL's set orientation, but the table orientation of most other databases clashes with SQL's internal processes. The need for deep-level translation

could make ad hoc queries slow and application development cumbersome and hard to debug. And the true SQL-engined products most of these vendors are developing may work so differently that you won't be able to leverage your present product knowledge very much anyway.

The vendors who now make SQL-based database servers must provide the

tasks including designing and editing applications, compiling, processing and debugging code, and creating and maintaining files.

You don't have to be an expert programmer to create a customized DBMS, but you'll probably want to program file-sharing features to make your application truly suitable for use on a LAN.

The Designer utility generates the source code for an application by combining screens, procedures, and reports you define with the prompts and fields you paint on the screen. You don't have to write a single line of code.

When creating a DBMS with Designer, you must specify whether the application is being created for a network or stand-alone environment. By selecting the network model, *Clarion* will automatically include code for a multiuser system. A read-only lock is placed on a file or table when a user on the network tries to access it while another user is changing it.

### LOCKING LIMITATION

The way *Clarion* has chosen to implement its automatic-locking feature presents one limitation: the person who tries to access

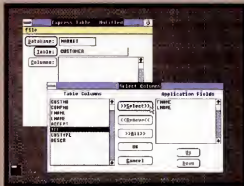
kind of friendly front ends PC users expect these days—either by building them or by forming alliances with PC-based database vendors.

The process of selecting a front end must start with considering what server best suits your needs. It appears that *SQL Server* and *OS/2 Extended Edition Database Server* are targeted at high-end applications now running on large LANs and minis, while the Novell, Gupta, and XDB products focus more on applications now running on smaller LANs. And Oracle will probably target integrated VAX-PC applications.

For those who want to look at something completely different, Advanced Data Servers of Boise, Idaho, has begun shipping a release of a \$23,000 server that puts ANSI SQL in silicon and promises compatibility with *DB2* and *Extended Edition*.

In any case, you're likely to become far more familiar with the SELECT-FROM-WHERE format of a typical SQL query before too long.

Lee Thé is West Coast editor of PC Magazine.



Gupta's Express Windows prompts users for the SQL databases, tables, and columns that make up a Microsoft Windows form—all without any programming.



the table or file that is currently being changed doesn't know that someone else is also working on it. *Clarion* lets the changes of the first person to finish updating the file take precedence. For example, assume workstation 1 begins to add a large group of records to a table. Workstation 2 then retrieves the same table, without being advised that workstation 1 is currently working on it, and quickly deletes one record before workstation 1 finishes working on the table.

Workstation 1 finally finishes adding the records, but *Clarion* won't accept the add because the table in question has been changed since workstation 1 started working on it. Clearly it would be more effective and safe to deny workstation 2 access

to the table until workstation 1 finished changing it.

You can use the source code you generate with Designer to create a framework for your final DBMS, supplementing it with additional *Clarion*-language file- and record-locking commands and adding data-security commands to ensure data integrity. And in most instances, you really do need to add some data-protection features to the code generated by the Designer utility.

You can also choose to protect and/or encrypt the individual files included in applications you create with Designer. If you choose to protect a file, you're setting the

Protect attribute of the file. While you can view the protected file with *Clarion's* Scanner utility, you'll be unable to change the file with any of *Clarion's* utilities. If you choose to protect a file with an owner code, you are actually assigning a password to the file. To access the file in any way, the owner code must be typed in before the file will be opened. These features turn out to be extremely useful when it comes to protecting sensitive data from curious workstation users.

*Clarion's* automatic refresh tool is an important and welcome feature. If someone updates a table while you're working on it, the modified data will be displayed on your screen as the update is completed and you attempt to change the same table.



## DATABASES: SUMMARY OF FEATURES

(Products listed in alphabetical order)

This table compares salient features of the programmable multiuser databases we reviewed. It does not mention some of the features they all have in common:

- They all allow the user to specify file definitions.
- They permit multiple-record deletions and updates, math updates, and text updates.
- They permit searching for the first occurrence of a string—and for all occurrences—without limiting the search to indexed fields.
- They allow multiple file access for queries.
- Each of them supports a full-screen editor.

	Clarion Professional Developer	PC DataEase	dBASE IV Developer's Edition	dBXL/LAN	PC Paradox 3.0	R:BASE for DOS
<b>COMPATIBILITY</b>						
Runs under Novell's Advanced NetWare, Version 2.15	●	●	●	●	●	●
Runs under IBM's PC LAN	●	●	●	●	●	●
Runs under 3Com's 3+Share	●	●	●	●	●	●
Runs under Banyan's VINES	●	●	●	●	●	○
Requires NetBIOS	○	○	○	○	○	○
Offers guaranteed growth path to accessing SQL database engines	●	●	●	●	●	○
Uses expanded memory (LIM 4.0)	○	●	○	●	●	○
Uses extended memory	○	○	○	○	●	○
<b>DATA MANIPULATION</b>						
Maximum number of simultaneous indexes	249 per file	254	500	7 per file	255	800
Maximum length of indexed field	242 bytes	255 characters	100 characters	100 characters	1,350 characters	20 bytes
Unique index value	User's option	User's option	User's option	User's option	Required	User's option
Maximum number of open data files	250	60	10	10	Unlimited	80
<b>SEARCH PARAMETERS</b>						
Case-sensitive	●	○	●	●	●	○
Whole word	○	○	○	○	●	○
Value or character range	●	●	○	○	●	●
Wildcard or string segment	○	●	●	●	●	●
Boolean	○	●	●	●	●	●
Compound Boolean	○	●	●	●	●	●

■—Editor's Choice ●—Yes ○—No

N/A—Not applicable; this program does not provide password protection.

\* *Clarion's* proprietary language has programming tools for creating these abilities.

## LAN LANGUAGE



The Clarion language has several commands that maintain data integrity while allowing transparent sharing of files on a LAN. The Share statement is used to open a file in a multiuser system, allowing control over the file to be shared among users on the network. If you want the file to be opened in such a manner that other users are able to read the file but not write to it, the Share statement is not appropriate, and the file should be opened in the normal manner.

Clarion offers both record- and file-level locking. The Lock command sets a "file lock" flag in the data file header, restricting all access to the file. Optionally, you can add a second parameter to the

The Clarion language has several commands that maintain data integrity while allowing transparent sharing of files.

Lock statement specifying an amount of time in seconds to wait for the file to be unlocked if it is already locked by another user. This feature effectively avoids the dreaded "deadly embrace" by releasing control instead of waiting forever for the file in question to be unlocked. (A deadly embrace occurs when you need to update records in the same two files someone else needs. You've locked one, the other user has locked the other, and you're each waiting for the other to release the files.)

The Hold statement sets a "record hold" flag in the file header, preventing another user on the network from updating a record. Since accessing a new record releases a held record, only one record can be held at a time. As with the Lock state-

	Clarion Professional Developer	 DataEase	dBASE IV Developer's Edition	 dBase Paradox 3.0	R:BASE for DOS
<b>QUERY LANGUAGE</b>					
Proprietary	●	●	○	○	●
dBASE III-compatible	○	○	●	●	○
SQL-compatible	○	○	●	○	○
Other	○	Query by example	Query by example	dBASE macro language	○
<b>PROCEDURE EDITOR</b>					
Allows use of third-party editor	○	○	●	●	○
Allows applications to leave messages for one another	●	○	○	●	○
<b>LOCKING</b>					
Implicit file locking	●	●	●	●	●
Explicit file locking	●	●	●	●	●
Implicit record locking	○	●	●	●	○
Explicit record locking	●	●	●	●	○
Field locking	○	○	○	○	○
<b>SECURITY</b>					
Passwords for databases	●	●	●	○	●
Passwords for files	●	○	●	○	●
Individualized access templates	○*	●	●	N/A	●
User-specified read-only vs. read/write access	○	●	●	N/A	●
Access definition by database	○*	●	●	N/A	●
Access definition by table	○*	●	●	N/A	●
Access definition by field	○*	●	●	N/A	●
Hierarchical definition	○*	●	●	N/A	○
Case-by-case definition	○*	○	●	N/A	●
<b>DATA RECOVERY</b>					
Audit trail	○*	○	○	○	○
Mirror-image backup	○	○	○	○	○
Automated recovery from LAN crashes	○*	○	○	○	○

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### LAN APPLICATION SOFTWARE

### DATABASES

ment, a second parameter indicates the amount of time to wait for a locked record to be released.

*Clarion's* Recover statement allows you to recover from a system failure. If you have a file or record locked when the LAN fails, the "file lock" or "record hold" flag is set permanently, corrupting the file. The same situation results if keys are being updated or transactions are being logged when the LAN crashes. Including the Recover statement in a program limits the amount of time a record or file can be held, allowing you both to recover corrupted files and to prevent someone from locking a file or record and then leaving for lunch, or vacation.

Although *Clarion* doesn't have special commands to create a system of multilayered passwords, it's a simple matter to construct a small program (using if and case statements to control program flow) to handle this task for you. The network administrator can have exclusive access to a password table by using the owner statement to protect the file housing the table.

### SLOWING DOWN FOR SECURITY

*Clarion's* method of handling file and record locking is at least partially responsible for its comparatively sluggish performance on several of our tests. *Clarion* is rather conservative about adding, deleting, or updating records in a file. Before it will allow a user to make changes, it checks the file header timestamp to make sure the file hasn't been changed since the user began reading it. For example, every time a replace was performed in our Global Search and Replace test, *Clarion* checked the

PC  
MAGAZINE

### FACT FILE

CLARION  
PROFESSIONAL DEVELOPER

*Clarion Professional Developer*, Version 2.0

Clarion Software Corp.,

150 Sample Rd.,

Pompano Beach, FL

33064; (800) 354-5444,

(305) 785-4555.

List Price: \$695;

Language Extension

Modules: Data Base Three, \$49.50;

Communications, \$199; Finance, \$49.50;

Graphics, \$199.

Requires: 512K RAM (640K RAM recom-

mended), any DOS-based LAN, DOS 2.1 or

later.

In Short: *Clarion Professional Developer*

includes an extremely powerful programming

language in an elegant development

environment. While *Clarion's* Designer utility

offers some network capabilities without writing

code, most of *Clarion's* data-integrity features

must be programmed.

CIRCLE 407 ON READER SERVICE CARD

header of the file, a time-consuming exercise. Yet this overcautious approach does ensure maximum data integrity. *Clarion* representatives say the company plans to decrease the amount of header checking in the next release in such a way that performance is significantly improved while maximum data integrity is maintained. In all fairness, *Clarion* customized our LAN DBMS tests to maximize data integrity instead of speed. Remember that most of *Clarion's* file-sharing features must be programmed in an application.

Additionally, because *Clarion* addresses to DOS only and doesn't make use of any network operating system commands, it suffers a further trade-off in speed.

Four manuals accompany *Clarion Professional Developer*. The Getting Started

Networking applications generated with *Clarion Professional Developer's* Network Model automatically detect records changed by another station.



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You're sitting at your PC on the 3rd floor working on a spreadsheet budget. Suddenly, a message appears on your screen: "Bob requests help". You press a hot key, and like magic you are looking at Bob's screen. Without moving an inch you see that Bob is working on the company database. A dialog window appears and Bob explains his problem. Since your keyboard is active you instantly solve the problem, on Bob's computer.

With another hot key you decide to look in on Sue's computer screen. She's new and you need to keep an eye on her work. You see that she is working on a letter using a word-processor. You monitor her for awhile without interfering with her work. In fact, Sue doesn't even know you're there!

Hot key again and off you go on your rounds of the company. Viewing one screen after another, helping some, watching others. All from the comfort of your chair. Finished, you hot key back to your spreadsheet and carry on with your budget. Amazed, you think that support has never been this easy before.

## Workgroup Conferencing

As a workgroup problem solving tool, Close-Up/LAN is unsurpassed! Close-Up/LAN lets everyone in your workgroup work as a team. Your associates can chat in a conference, all linked together on screen, no matter how distant the locations. Bring up a spreadsheet, for example, and show your sales projections for all to see. With live keyboards and an instant screen

to screen connection, associates can adjust your figures (optionally at your discretion) for what-if scenarios.

### On-Network Meetings?

Close-Up/LAN lets you conference your people over a single network, over bridged networks, or between networks thousands of miles apart.

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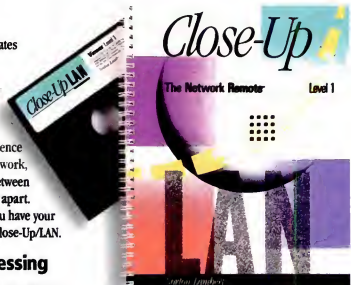
Close-Up/LAN distributes valuable LAN resources to all PCs on your network.

No matter where your PC is located you can access resources such as high speed processors (386's), CD ROM's, plotters, Irma type connections to mainframes, and modem equipped PCs that are connected to your LAN.

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Access is only a keystroke away. While working at your word processor, you decide to run a CPU intensive job on a 386 computer located somewhere on your network. Hot key to the 386 and control it as if it were your own. Close-Up/LAN connects your keyboard and screen to the 386. Start your CPU intensive job (like re-indexing a database). Then, hot key back to your wordprocessor. Toggle back, and you can view the 386.

Think of it. You can give everyone on your network the power of all peripherals at a fraction of the cost.



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LAP  
TO  
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EASY  
CONNECTION

## LAN APPLICATION SOFTWARE DATABASES

guide describes installation procedures and steps you through the process of creating an application with the Designer utility. The *Language Reference* and the *Utilities Guide* describe the Clarion language and utilities, respectively. The *Annotated Examples* manual contains annotated program listings, pointing out techniques that maximize the potential of the Clarion language, including a sample multiuser application.

In addition to the manuals, *Clarion* has an on-line tutorial that guides newcomers to the program through each of the utilities, the language structure, and the development environment. The Designer tutorial creates the same Phones application that you create following the instructions in the Getting Started manual. The sample programs in the Annotated Examples manual are also included on-disk. Unfortunately, little information about how to create a multiuser DBMS is contained in the manuals or in the on-line tutorials. A section describing how to use the language to develop systems for networks would be beneficial to those wishing to develop LAN-based DBMSs. The section "Sharing Clarion Files" included in the Language Reference is helpful, but more examples would be welcome.

*Clarion* was fairly easy to install. The Install program creates a directory on the hard disk you specify and requests permission to change the path statement in your AUTOEXEC.BAT file and the buffers and files statements in your CONFIG.SYS file. And it doesn't make mistakes when it alters your files. No special instructions for various LANs are given, so you must be familiar with your LAN's requirements.

Clarion Software offers several extensions to the Clarion language called Language Extension Modules (LEM). These packages contain procedures and functions for developing specific types of applications. The *Data Base Three* LEM allows you to convert dBASE III programs to Clarion. This LEM can be quite valuable to a dBASE programmer desiring the extensive customization that Clarion offers.

Although *Clarion Professional Developer* doesn't have a lot of LAN-specific features straight out of the box, it is an attractive choice for serious DBMS developers desiring strong relational and report-writing capabilities, as well as greater sophistication than is generally available from DBMS languages.



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## PERFORMANCE TESTS: LAN APPLICATION SOFTWARE—DATABASES

Torture testing at PC LAN Labs turned up a clear winner among the multiuser databases: *Paradox 3.0*, which scored first in 18 of 24 cases. Others, notably *DataEase* and *R:BASE for DOS*, displayed particular strengths on specific tests.

Testing LAN databases proved a formidable task. We began with three linked databases for Customer, Item, and Order information, with a total of 35,000 records. Specifications were written for a multifunction suite of eight tests emulating transactions a database user might perform. All tests involved locking and forced contention, and some tests forced queuing.

The tests involved synchronization so that all workstations started at the same time on each test. Each test was run five times, with the first run discarded. The four remaining runs were averaged, and the results are reported here. Note that within each test, a given procedure was run repeatedly, as described in the separate captions.

Prior to testing, we sent the test specifications, along with sample *dBASE* code, to the vendors of all of these database packages. We asked them to review the specs and code and then make it work for their packages. All programs were required to use the same database table and its records, perform the same functions, synchronize the workstations, and follow a number of other rules. Optimizations, changing the database tables to native file formats, and some procedural deviations were allowed. Structural changes were not.

We encouraged the vendors to provide high-level technical support during the testing, and all of them did. Although the vendors' representatives arrived at PC LAN Labs in the morning, none were able to complete a successful test run until the afternoon, partly because in some cases we complicated their task with a last-minute change in the synchronization routine. The time they spent demonstrates the difficulty of writing bug-free LAN DBMS code, even among experts using the products they know best.

The tests were performed on one, two, three, four, and five workstations.

We used three 12-MHz AT-compatible Dell System 200s and two 8-MHz IBM PC ATs. All workstations had 640K conventional memory and 2MB of expanded memory. The network operating system was Novell's *NetWare*, Version 2.12, running on 3Com 3C503 EtherLink II and Gateway 8-bit G/Ethernet network cards, with thin Ethernet cabling. We used Compu-link's ACS III rack-mounted optimized *NetWare* server system built around a Wyse 25-MHz 386 platform.

Although we performed five versions of each test, adding a workstation each time, we are reporting only the test scores for one, three, and five workstations. The scores with two and four workstations followed the curves demonstrated in these results.

All workstations used the same files but performed record searches and edits on different records. For example, the first workstation would search for record 11111, the second for record 11112, the third for record 11113, and so on.

The **Search and Add Records** test asks the program to search for a specific record and replace it with an active index. The program then adds a record (based on the workstation number) at the end of the database; on successive iterations, records are added in descending numerical order. The whole procedure is performed 100 times per test.

In the **Indexed Search (Successful)** test, the program searches and finds a specific record while an index is active. The search is performed 100 times per test.

In the **Indexed Search (Unsuccessful)** test, the program searches for a specific record while an index is active. The record does not exist, and the program is forced to search the entire database. This search is performed 100 times per test.

In the **Sequential Search (Successful)** test, the program searches and finds a specific record while no index is active. The search is performed twice per test.

In the **Sequential Search (Unsuccessful)** test, the program searches for a specific record while no index is active. The record does not exist, and the program is forced to search the entire database. This search is performed twice per test.

In the **Search and Adjust Indexes** test, each workstation searches for a different record while indexes are active. An edit is performed, forcing the indexes to adjust. The same records are then re-edited, forcing the indexes to readjust and the records to return to their original state. The procedure is performed 100 times per test.

In the **Report Using Two Databases** test, a report is generated using two tables. It includes 250 customers and shows the names, orders, quantities, and dates. The report is printed to the screen ten times per test.

In the **Global Search and Replace** test, two global searches and replaces are performed while an index is active. Beginning at a specific record number, the program searches a table and replaces each occurrence of a value. A second search end replace restores the original value. Because all workstations are looking for the same records in the same files, file locking is activated. The entire procedure is performed ten times per test.


**PERFORMANCE TESTS:  
LAN APPLICATION SOFTWARE — DATABASES**

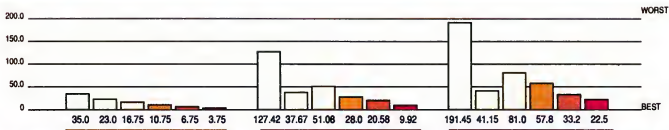
ONE STATION

THREE STATIONS

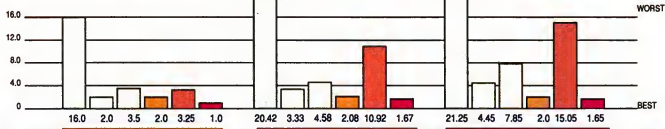
FIVE STATIONS

**Search and Add Records**

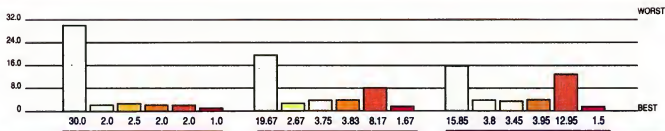
Elapsed Time (seconds)

**Indexed Search (Successful)**

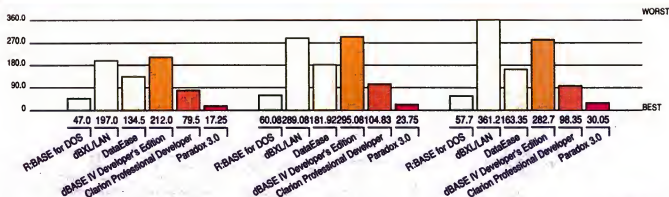
Elapsed Time (seconds)

**Indexed Search (Unsuccessful)**

Elapsed Time (seconds)

**Sequential Search (Successful)**

Elapsed Time (seconds)



CONTINUES


**PERFORMANCE TESTS:  
LAN APPLICATION SOFTWARE — DATABASES**

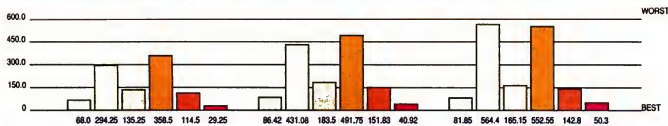
ONE STATION

THREE STATIONS

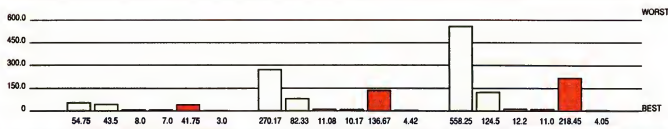
FIVE STATIONS

**Sequential Search (Unsuccessful)**

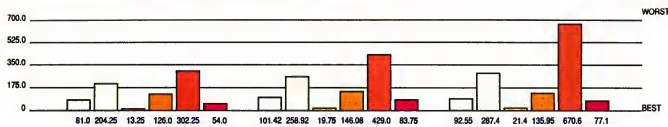
Elapsed Time (seconds)

**Search and Adjust Indexes**

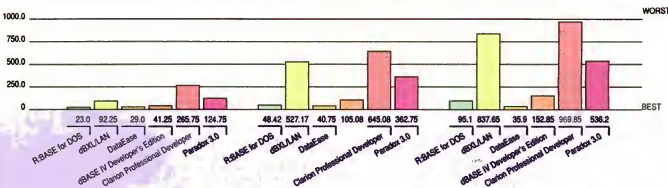
Elapsed Time (seconds)

**Report Using Two Databases**

Elapsed Time (seconds)

**Global Search and Replace**

Elapsed Time (seconds)



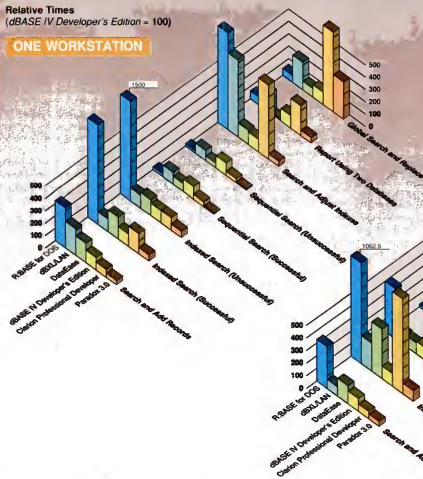


# PERFORMANCE TESTS: COMPOSITE VIEW

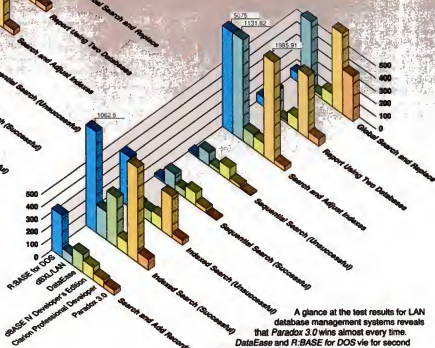
Relative Times

(dBASE IV Developer's Edition = 100)

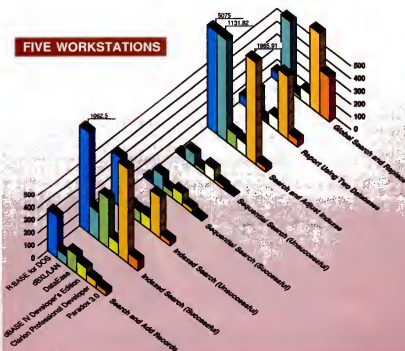
## ONE WORKSTATION



## THREE WORKSTATIONS



## FIVE WORKSTATIONS



A glance at the test results for LAN database management systems reveals that Paradox 3.0 wins almost every time.

DataEase and R/BASE for DOS vie for second place, and dBASE IV Developer's Edition isn't bad. On closer inspection, the different products' relative strengths and weaknesses become apparent. Optimizations were allowed throughout the testing, and those products with customizable operations fared better.

Paradox's ability to customize block sizes through its PAL language resulted in fewer reads and faster times. Paradox employed other optimizations as well: concurrency testing was turned off (reducing overhead double checks) and a semaphore (pseudo file) was used to indicate that a locked file was ready. Yet our specifications for report writing worked against Paradox; it would not relate two tables in the manner we required, so the programmers had to write a program to perform this function.

DataEase excelled on the report-writing and search-and-replace tests. R/BASE was another strong contender, outdoing all the competition except Paradox on sequential searches.

An anomaly occurred when R/BASE ran the Indexed Search (Unsuccessful) test. R/BASE was considerably slower with one workstation than with two, three, four, or five. Caching, along with keeping the binary tree index in memory, resulted in faster timings as more workstations were added. In other instances where multiple workstations resulted in faster timings, the fast Compu-link Novell server caching was the cause.

Although Clarion Professional Developer's scores were the slowest on a number of tests, the program's conservative file and record locking deserves a close inspection by serious LAN users. dBASE IV had respectable midrange numbers throughout most of the tests, despite a tendency to slow down as the number of stations increased. dBXL/AN was usually in the same league, and occasionally faster. Note how well both dBASE IV and dBXL/AN performed on indexed searches.

Be sure to match your needs to the strengths of these products. If you are writing a lot of reports linking several databases, look at the pertinent test (Report Using Two Databases). If you have multiple users updating the same database at the same time, the Global Search and Replace scores should interest you. If you require complete control of underlying operations (such as locking or file block sizes), look for packages with full-featured programming languages that allow this type of customization.

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## DataEase

by Alfred Poor

Here's the worst thing you can say about *DataEase*, Version 4.0: it came in second in our performance tests. With that out of the way, we list all the positive features of *DataEase International's* \$700 program. In short, Version 4.0 has inherited all the good aspects of the earlier versions while fixing some of their problems.

One of the most significant improvements in *DataEase* 4.0 is the convergence of the single-user and LAN versions of the program; they now exist as one version that can function in either environment.

The individual \$700 package can support one user, either standalone or on a server. You can increase supported users through bump disks that are offered in two packages. The five-user package lists for \$1,000 and includes a single disk and five quick-reference manuals. The single disk means that all five users must be added to the same server. The three-user pack costs \$750 and includes three quick-references and three disks; this enables you to add the additional users to different servers. Both packages include coupons so that you can purchase full documentation if desired.

### IMPROVED ADDITIONS

*DataEase* 4.0 has also improved its assignment of function keys. The Escape Key now is the (more logical) Exit command for all screens, and the F4 key is used to call up a drop-down menu bar at the top of the screen. As always, all significant function keys are prompted at the bottom of the screen, and the assignments are consistent across all modes of the program.

The program has a new "table" view that complements the traditional *DataEase* "form" view for your data. Press a key and you'll see the records displayed in a record-per-line format, much like the *dBASE* Browse or the *Paradox* table format. You can view, modify, enter, and delete records.

Among the many added commands and functions is the Soundex function for searching a table. If you don't remember how to spell a name, you can use Soundex to search for it based on how it sounds. Databases also now have full-length names: in earlier versions you referred to a database by a single letter, but now you can give your applications meaningful names

in the same manner that you can name your data forms and reports. You can also import applications from *dBASE*, *Paradox*, and *Lotus* 1-2-3. The *dBASE* and *Paradox* conversions also include data-entry screens as well as the data.

The most important characteristic of *DataEase*, however, is not new: it continues to meet the needs of users at all levels of skill and experience.

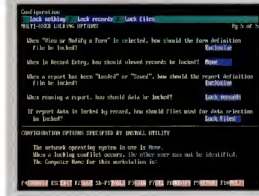
### NEW USERS, OLD HANDS

For the benefit of novices, *DataEase* is completely menu driven. You can create a flat-file application in just a few hours, including custom data-entry screens and reports, simply by filling in blanks, selecting from lists of choices, and "painting" screens. You can create custom queries easily by entering your choices on the data-entry screen.

Multiple-table applications are no more difficult, since you can create defined relationships between tables or specify them on the fly. *DataEase* even makes it easy to

select certain records from one table based on the values of fields in records contained in a related table, but make the selection based on values entered by the operator at the time the procedure is run? Want to take the results, sort them three levels deep, with subtotals and statistical summaries computed at each break point, then report them in a format that lists multiple lines for each record? How about modifying the reported records based on a formula and wrapping the whole thing up so it can be selected off a custom menu that loads when you first start the program? No problem: *DataEase* makes it a snap.

Power users who want to get down to the nitty-gritty of laying down a few hundred lines of code can do that too. The *DataEase* Query Language editor can prompt you through the most complex procedures; if you prefer, you can turn off the prompting and write more extemporaneously. The full-screen editor has many of the features you might expect, including block copy and move operations. More important is the fact that the editor runs a detailed syntax check on your code before it



*DataEase* 4.0 offers a number of automatic record- and file-locking features, many of which can be altered from the configuration screen. These options allow a system administrator to tune the system for best performance without programming.

create a table of related records on a data-entry screen, such as order items on an invoice record. The table lines can scroll, so you can have more lines than fit in the window. This sophisticated screen design is all done through the regular menu-driven facilities; absolutely no programming is required. Ad hoc queries on multiple tables are as easy to create as they are with a single table; you can do it all by filling in blanks on the data-entry screens.

*DataEase* also takes intermediate users by the hand when it comes to creating some rather complex procedures. Want to

lets you save your procedure file. This feature works surprisingly quickly, is extremely effective, and can save hours of work.

*DataEase* also contains a collection of locking commands that will enable programmers to control shared access of the database. You can lock records and tables or even the entire database. Record and table locks can be either shared so that other users can view but not change the data, or exclusive so that all other users are prevented from even viewing the data.

These commands are required only when you are coding your own complex

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procedures, since *DataEase* does a masterful job of handling simultaneous access automatically. The system configuration screen makes it easy to set the default settings for the automatic locks, and the documentation does a good job of explaining the advantages (and possible risks) of the different options.

As a result, you do not need to be a programmer to make a functioning shared application in *DataEase*. There are even options open to the user to enable continuous screen refresh so that changed records are displayed automatically whether you are in the form or table view.

#### SAFE AND SECURE

Database security is just as easy. *DataEase* relies on a seven-level hierarchical system. This means that if you have a higher security level than other users, you can access everything that they can, but they may or may not have access to all that you have. The different *DataEase* security levels also have some built-in restrictions in terms of the different kinds of database-maintenance functions each is permitted to perform.

Password protection starts at the very top, where you call up a database on the opening screen. If your name and password are in the system, you gain access to the system but only to the extent that your security level will permit. This permission applies to tables, as you would expect, but it also goes further. You can define access levels for individual fields, as well as custom menus. Since you can also define which menus each user will see when signing on, you can control precisely which functions they will have access to within the database.

Installation on a LAN is extremely simple. The whole program comes on just three 5¼-inch disks (two 3½-inch disks) plus an extra one for the tutorial files. There is a comprehensive installation procedure that steps you through the entire process. The program is smart enough to make use of the special resources offered by your LAN operating system. For example, it knows how to use the Novell shared locks for file and record locking but creates its own semaphores for other systems that do not offer such a feature.

A *DataEase* representative pointed out one additional tuning adjustment that can be made at the time of installation and can have a significant impact on the system performance. Under the default settings, *DataEase* will pop up a message when a

desired resource is locked by another station. In general, this message lists the item and the name of the user and of the workstation that has it locked. (Note that LAN operating systems that do not use peer-to-peer communication facilities cannot produce the workstation portion of the message.) Since this requires peer-to-peer communication, it can increase the load on the network and slow down the processing at the workstation level. As a result, some system administrators find that they are better off disabling these messages.

Not only is *DataEase* 4.0 a good solution for the present, but it is also poised to take advantage of the future. The company states that any existing *DataEase* 4.0 application will be able to run on any database server designed using SQL client server architecture, such as the anticipated Novell or Gupta servers. This means that your development efforts can take advantage of high-performance LAN database technology as it becomes available.

In the final analysis, *DataEase* has it all. It has good performance numbers, including top marks in the reporting aspect of our benchmark-test suite. It is an appropriate tool for users at all levels of experience and needs, since it combines automated and menu-driven ease-of-use for novices with a powerful, full-featured programming language for the experts. It also makes it easy to combine projects from both camps, and users can build their skills

as needed. The functions, commands, and utilities that have been added since the last version are also a strong indication that the *DataEase* company is not willing to rest on past successes but intends to keep moving the program ahead and making it even better than before.

## dBASE IV Developer's Edition

by Greg Campbell

Running on a local area network, *dBASE IV*, the successor to the venerable *dBASE III*, offers a mixed bag of features and performance. Depending on the test, performance-test results range from the speedy to the sedate, and some buggy features go hand in hand with increased robustness.


There are two distinct *dBASE IV* products: *dBASE IV* (standalone \$795), and *dBASE IV Developer's Edition* (\$1,295). Both products can handle multiuser databases on a LAN, as well as run on a standalone PC. For our performance tests, we used the *Developer's Edition* (which supports up to three users) on a *NetWare* Ethernet LAN. LAN Packs (\$995 each) authorize five additional, simultaneous network users.

Included with *dBASE IV Developer's Edition* is the runtime product, which allows you to create *dBASE* applications to support an unlimited number of simultaneous users. Since these applications do not require the *dBASE* kernel, you can freely distribute them without violating the *dBASE IV* software license, a cost-effective way to create applications for many simultaneous users.

#### GETTING STARTED WITH dBASE

You can install *dBASE IV* on a network from any workstation; PCs need at least 512K of memory to run the program. Although *dBASE IV* is not copy protected, you must use the ID program to brand the System #1 disk with your company's name before installing the program. This information becomes permanent once entered, so check your spelling carefully!

The Install program for the *Developer's Edition* prompts you for each of the 20 disks in sequence and will identify any previously installed copies of *dBASE*. After copying the program files to the file server, run the *ADDUSER4* program to bump the




**FACT FILE**

**EDITOR'S CHOICE**

*DataEase*, Version 4.0  
*DataEase* International Inc., Seven Cambridge Dr., Trumbull, CT 06611; (800) 243-5123, (203) 374-9000  
 List Price: \$700  
 Upgrade from Version 2.5 or LAN Version 1.0, (\$125)  
**Requires:** 640K RAM, expanded memory (LIM 3.2 or 4.0) supported; Banyan's VINES, Novell's *NetWare* 86 or 286, 3Com's *Etherseries* and 3+, IBM's PC LAN, or AT&T's *StarLAN*, DOS 3.1 or later.  
**In Short:** *DataEase* 4.0 is better than before, combining single and multiuser support in a single package, plus many new features that make it easier and more powerful. The program's main strength continues to be its ability to be useful to beginners as well as programmers looking for a full-strength development package.

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# BUDGETING and PLANNING

## Software That Can REALLY Help... At Last!

by Paul A. Strassman  
Inc. Magazine

**Ronstadt's Financials™ is a milestone in the availability of high-quality business advice at a low cost.**

It's a milestone because it's the first software that enables you to focus on the validity of the assumptions underlying your planning and budgeting projections. Too many companies suffer from the curse of the spreadsheet: an emphasis on the generation of consistent numbers instead of on the examination of critical assumptions.

Assumption-based thinking is the key to successful planning and budgeting. And only one software package lets you spend more time thinking about your assumptions, and speed through the budgeting and planning process, **Ronstadt's Financials** (\$245 plus shipping, Lord Publishing, Inc., 8A Pleasant St., S. Natick, Ma. 01760; 1-800-525-5673; in Ma., 1-508-651-9955).

Another difference between other software programs and **Ronstadt's Financials** lies in Ronstadt's approach, which is to provide know-how he has accumulated as an entrepreneur, researcher, and teacher.

Recently I was describing Ronstadt's package to the chief financial officer of a good-sized and long-established retailer, who asked if the software was applicable only to start-ups. As I told him, there is so much sensible advice packaged in the collection that I would not hesitate to use it as a standard budgeting package for a company of any size.

I agree with Ronstadt that most existing planning packages encourage you to rush into cranking out the numbers before you understand exactly what you are trying to accomplish. That is not Ronstadt's approach. His package includes a 198 page book, **Entrepreneurial Finance**, which allows you to think through the ingredients that will be essential for your business to succeed before you open the **Ronstadt's Financials** manual.

Should you need even more guidance, Ronstadt also offers two workbooks that are worth their price. The

**Venture Feasibility Planning Guide—Your First Step Before Writing a Business Plan** (\$19.95, 127 pgs.) takes you, step-by-step, through 118 tough questions that ought to be asked by all who place their careers or other people's money behind a business proposition. I particularly like the 4-page section called "Reality Check". The other workbook is **The Business Plan—A State-of-the-Art Guide** (\$29.95, 175 pgs.), a set of common sense exercises in planning.

Ronstadt does much more than simply provide another clever software solution to speed up a task that maybe you shouldn't be doing at all. He delivers a do-it-yourself consulting and an M.B.A. level tutorial product that helps you plan more intelligently.

The manual for running the software is easy to understand and also emphasizes how to apply the computing power. Its accounting structure is standardized (Revenue Forecasts, Profit and Loss Statements, Balance Sheet, Cash Flow), although you can add items that apply to YOUR business. **Ronstadt's Financials** also computes

33 standard Key Ratios and Measures, such as return-on-equity, contribution margins, breakevens, which should be valuable guideposts.

**If you have any computer experience, you can pick up this package and get it working on your company's plan in less than 15 minutes.**

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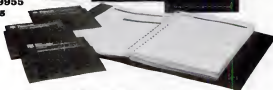
And if you have never used a financial-planning program before, you can get a **Ronstadt's Financials Demo** (\$9.95) to help you decide if the program will be useful for you.

Well laid plans may sometimes falter because implementation is poor. But even the best of plans will surely be destroyed by an enterprise that is conceived in error.

*Excerpted from Inc. Magazine, June, 1989, Mr. Strassman managed the computerized information systems for General Foods, Kraft, and was Vice President of Strategic Planning at Xerox.*

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**Ronstadt's Financials** is also available at Eghed Discount Software, PC Connection or your local software retailer. For 640K IBM PC, XT, AT, PS 2 and compatibles. Both 3½" and 5¼" diskettes included with package. Graphics and math co-processor supported.

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The Logical Connection  
Equinox Alternet  
Alliance  
Rose Master Switch  
Commix 32

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July 1989  
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*"Data Switches: A Low-Cost LAN Alternative"*  
July 1989 PC Magazine



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## DATABASES

maximum number of simultaneous users. You can add users in modular increments of 1, 3, or 5.

The network administrator prepares workstations to run *dBASE IV* by ensuring that each CONFIG.SYS file has the recommended FILES=99 and BUFFERS=15. The Install program does not change CONFIG.SYS or AUTOEXEC.BAT. The network administrator may also create CONFIG.DB files to reflect each user's *dBASE* preferences. If using the optional Protect security system, the database administrator must create user names, passwords, and access levels before anyone can use *dBASE*.

Version 1.0 documentation claims that *dBASE IV* automatically supports extended and expanded memory, but that feature did not make it into the 1.0 disks that shipped. One way to use extended or expanded memory is to create a 2- to 4MB RAMdisk and copy files over to it.

The *dBASE* program consists of a root program and seven overlay files. Overlay files are repeatedly copied from the file server to the workstation, creating a lot of network traffic. You can substantially reduce this traffic and increase performance by copying the program and overlay files to a RAMdisk at each workstation. Surprisingly, copying these overlays to a local hard disk actually decreases performance, as most file servers have very fast hard disks combined with disk caching.

## BAD NEWS BUGS

Several bugs exist in Version 1.0 (though Ashton-Tate says that Version 1.1, due out soon, should correct many of them). For instance, you could crash your System#1 disk, as we did, by running the ID program

**FACT FILE**

**PC MAGAZINE**

**dBASE IV Developer's Edition, Version 1.0**  
Ashton-Tate, 20101 Hamilton Ave., Torrance, CA 90502; (213) 329-8000.  
**List Price:** *dBASE IV* (standalone), \$795; upgrade from previous release, \$175. *dBASE IV Developer's Edition*, \$1,295 for three users; upgrade, \$475. LAN Pack, \$995 for five additional users; upgrades free.

**Requires:** 640K RAM; Novell's NetWare, 3Com's 3+ Share, IBM's PC LAN, Ungermann-Bass's Net One. Untested but claimed to run on 3Com's 3+ Open, or Banyan's VINES; DOS 3.0 or later for standalone use, DOS 3.1 to 3.31 for multiuser LAN use.

**In Short:** A well-performing multiuser database with automatic record locking. The programming language, a de facto standard, is robust enough for virtually all multiuser applications. However, extensive error checking results in lengthy programs.



CIRCLE 408 ON READER SERVICE CARD

on a workstation connected to a LAN with a clone file server using a Phoenix BIOS. Ashton-Tate will supply a new disk for users caught in this situation.

The way around that problem is to run the ID program on a standalone PC. That PC can be a clone with a Phoenix BIOS, as long as the network drivers are not loaded. Once the ID program successfully runs, you can finish the installation from any networked workstation.

A more distressing bug is that hitting Ctrl-Break hangs the workstation, surprising any unsuspecting user who was merely trying to abort a long-running job using

this key combination. The only way out is to reboot the workstation with the databases still open. Luckily, we did not damage any databases when forced to do this, but it is always unnerveing to reboot a PC that has stopped while updating multiuser databases.

## dBASE IV BASICS

*dBASE IV* is a more robust product than *dBASE III*, offering improvements to the user interface, performance, and multiuser capabilities. Improvements to the programming environment include better error-handling, more-easily-programmed windows and menus, and improved file and record locking.

Several of the new features require you to convert your old databases. The Convert process simply adds a new field called *dbase*lock to each converted database. This field contains information on the date, time, previous value (a 1-byte CRC field called Count), and log-in name of the last person to lock this record.

At the heart of the user interface is the Control Center, which has pull-down menus for every full-screen component of *dBASE IV*. Additionally, you can toggle between Browse and Edit modes with a single keystroke. The powerful search features of Browse include Find First, Find Next, Match Capitalization, and stopping Near the closest match.

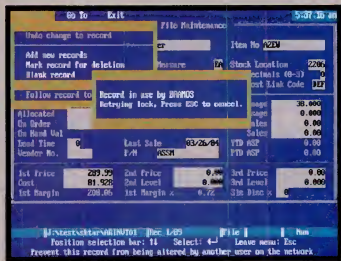
SQL and Query by Example (QBE) are also included, but the bad news is that they are only loosely integrated into the product. These interfaces generate *dBASE* code that is reprocessed; because of this, they are always slower than the equivalent *dBASE* code. The good news is that you can copy the generated code and use it in your *dBASE* programs.

Space in the memo file is recycled so that .DBT files won't grow unwieldy. Memo fields can also be painted on the same screen as regular database fields. Memo fields are searchable, and most text-manipulation functions work with them.

In *dBASE IV*, the new .MDX file structure allows you to build indexes for fields, portions of a field, and any combination up to a 100-character limit. Databases automatically use their production index, hence they cannot get out of sync; up to ten alternative .MDX fields can be used with the production index.

## LOCKING UP YOUR DATA

*dBASE*'s Protect utility allows you to define user names and passwords, assign



*dBASE IV* includes record-locking features in its multiuser version. Here, the Lock command is found in the Records menu. A message appears indicating that the record has been locked.

eight hierarchical access levels, and encrypt your databases.

While it is fairly easy to bypass the Protect utility if the databases are not encrypted, using it will help keep most casual users from viewing sensitive databases. You can limit access to certain databases and fields but not to specific records within a database.

*dBASE* allows good control of automatic locking with Set Lock. You can use this to control whether the locks will or will not be used automatically. Being able to turn automatic locks off is an important feature, helping you speed up operations when it is appropriate.

Even though *dBASE IV*'s automatic locking is effective, there will still be times when you'll find it better to code your own locks and error routines. Indeed, during our PC Labs tests, the Ashton-Tate pro-

cannot successfully complete, *dBASE* restores, or rolls back, the affected records to their previous values. However, these functions address only the last transaction of each user, rather than all transactions since the last backup. Besides being unable to roll a database back more than one transaction, you cannot roll an old database forward to restore it to the point of failure. A power failure or system hang with open databases could result in loss of data unless the application maintains a separate transaction log.

New functions related to transactions and locks allow you to test whether transactions are in progress by others and to look for corrupted databases. You can also determine the date, time, and log-in name of the last user to lock a record. The CHANGE() function allows you to detect whether a record has been changed since it was opened. However, the CHANGE() function is unreliable when used in conjunction with Transactions since they may be rolled back later.

On the glitzy side are features such as dynamic screen updates. Browse screens can automatically update to reflect changes made by other users, a real benefit when it comes to applications in which many people are browsing through the same data. The Set Refresh command controls this feature and can be disabled for improved performance, as constantly comparing records for changes increases both the network and workstation load.

Error-correcting procedures can be very lengthy coding feats. One example in the *dBASE IV* manual has about 60 lines of code, yet it probably could not handle the "lunch lock" test. Lunch lock refers to the situation that occurs when a user leaves his workstation with a locked record or file open and does not return for an extended period of time, thereby tying up anyone trying to access that record or file.

#### NOW AND THE FUTURE

The speed of *dBASE IV*'s native language and indexed queries is impressive, but the poor integration of SQL and QBE is not. The complete suite of locking functions and commands allows the programming of nearly any type of multiuser application. However, programs will be very lengthy and complicated if they do extensive error checking. The *dBASE* programming language is not very compact, and only simple programs or low-usage databases dare

rely exclusively on automatic locking.

The future of *dBASE IV* seems solid. Plans exist for migrating to the Ashton-Tate/Microsoft SQL server database engine. In addition, Version 1.1, which should be out this fall, may come with mouse drivers and EMS support. With the elimination of a few bugs and some performance increases, *dBASE IV* could win back *dBASE III* clone users.

## dBXL/LAN

by Greg Campbell

*dBXL/LAN* is WordTech Systems' multiuser version of its *dBXL* product. This self-proclaimed "*dBASE III Plus* superclone" offers multiuser features not found in any other *dBASE III* workalike, including automatic file and record locking, concurrent browsing of data, automatic screen refresh, edit sensing, access identification, message sending, task sending, and screen transmission. This plethora of features, combined with a bargain-basement price of \$599 for unlimited users, makes *dBXL/LAN* a strong candidate for building multiuser database applications.


Why invest in a *dBASE III Plus LAN* clone when a network version of *dBASE IV*

Even though *dBASE IV*'s Set Lock automatic locking command is effective, there will still be times when you'll find it better to code your own locks and error routines.


grammer disabled automatic locking and used manual locking to enhance performance speed. *dBASE IV*'s manual locking functions now let you lock up to 50 records, and RLOCK() is now additive and no longer automatically releases previously locked records.

#### IMPROVING DATA INTEGRITY

The Begin and End Transaction commands allow you to confidently program multiple updates that must take place together to make sense. Transaction processing and rollback improve data integrity for multiple related updates. If a transaction


**FACT FILE**

**dBXL/LAN, Version 1.3**  
WordTech Systems  
Inc., P.O. Box 1747,  
Orinda, CA 94563;  
(415) 254-0900  
List Price: *dBXL/LAN*,  
\$599; upgrade to  
*dBXL/LAN* from single-  
user Version 1.3, \$299.  
Upgrade to *dBXL/LAN* from single-user Version  
1.1, \$318; from Version 1.2, \$258. Versions 1.1  
and 1.2 require *Networker Plus* utility, \$259.  
Requires: 440K RAM; Novell's *NetWare*,  
3Com's 3+ Share and 3+ Open, IBM's *PC LAN*,  
or Banyan's *VINES*; NetBIOS optional but  
required for messaging capabilities. DOS 2.0 or  
later for standalone use, DOS 3.1 or later for  
multiuser use.  
In Short: A *dBASE III* superclone that includes  
automatic record locking, programmable  
windows, graphs and charts, and extensive  
interworkstation messaging capabilities. *dBXL's*  
superior *dBASE III* commands allow you to  
create shorter, more-effective multiuser  
programs with less effort. Using WordTech's  
*Quicksilver* compiler, you can compile these  
programs into fast, unlimited runtime programs  
for less money than *dBASE*.



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\*Sheldon Needle survey, 1988

PG-879

is already available? In addition to the lower price tag, *dBXL/LAN* already contains one of the most important new features of *dBASE IV*: automatic locking. Its built-in communication and network error-recovery procedures offer enough functionality to let most programs rely exclusively on automatic locking for most day-to-day operations. You will still have to write programs to provide menus and applications,

but the programs will be shorter and better able to handle multiuser problems.

Strengthening its position as developer of a mainstream product, WordTech has plans to support virtually every SQL engine available for LANs. *Oracle dBase* is available now, and *dBXL/SQL* will soon be available for Gupta Technologies'

*SQLBase* and Novell's *NetWare SQL*. The company also plans for other SQL servers to follow shortly.

And finally, to allay your fears that Ashton-Tate might initiate a lawsuit on this spunky little clone maker, WordTech has an agreement with the company that precludes the possibility of a suit like the one currently facing *FoxBASE*.

#### **dBASE III PLUS, PLUS MORE**

Installing *dBXL/LAN* is simple: you just copy the five *dBXL/LAN* disks to a directory on the file server. There are only two overlay files, and *dBXL/LAN* can actually run from a dual floppy PC. *dBXL/LAN* requires 423K of available memory and will automatically use 64K of expanded memory (EMS) if available.

Besides supporting almost all *dBASE III Plus* commands, *dBXL/LAN* supplies additional commands to increase the functionality of the language. Conventional wisdom says to avoid using enhanced programming languages since they lock you into a particular vendor's product. In the case of *dBXL/LAN*, the benefits are such that you might be willing to accept that.

One significant improvement of *dBXL*

You'll see this message in *dBXL/LAN* after about ten automatic retries by the system. The window is created using *dBXL* commands and you can modify it if you want to, but as is, it does a nice job of handling most errors.

LASTNAME	FIRSTNAME	ADDRESS	CITY
Burt	Calhoun	140 Hitchin Rd.	Relesay
Trudy	122 High St.	Relesay	
Crosson	51 Redfield Crescent	Relesay	
Givens	51 Forester's Close	Relesay	
Bigger	Shuan	118 High St.	Relesay
Gray	Scott	36 Southill	Relesay
Leles	Joanne	42 Clifton Road	Relesay
Haddock			
Relesay			
Cooper			
Bauer			
Beattie			
Margaret			
Redner			
Falvey			
Hann			
Bowles			
Ellis			
Haynes			
Helen			
Pat			
Stevens			
Mark			
Elizabeth			
Gray			
Haynes			

Retry  
Message  
Config  
Retry  
Record is locked by another user.  
User: BURTIN.  
Retry attempt to lock record.

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LAN APPLICATION SOFTWARE  
DATABASES

and *dBXL/LAN* is programmable windows. *dBASE IV* has this feature, but *dBASE III Plus* doesn't. Being able to program windows allows you to write output to a window rather than to hard-coded screen locations. This makes it easy to move a window without having to manually change each row and column address; hence help screens, dialog boxes, and menus are easier to program.

In addition, converting a single-user program to multiuser operation with *dBXL/LAN*'s automatic locking simply requires the following commands: Set Exclusive Off makes databases sharable by other users; Set Autolock On enables automatic record and file locking; and On Neteror Do Neteror specifies how you want the program to handle multiuser conflicts and errors. WordTech includes an excellent *NETEROR.PR*G program that uses most of the extended communication features available through *dBXL/LAN*. You can use the program as is or modify it yourself.

*NETEROR.PR*G offers a graceful means of resolving most typical multiuser conflicts that occur when two users attempt to update the same record. After

automatically retrying to obtain a lock ten times, the system returns an error that indicates the lock was unsuccessful for the second user. This error condition calls *NETEROR.PR*G into play: the program shows the user the name of the person holding the locked record and offers four useful recovery options.

The logical first choice is Retry. If this doesn't bring relief, then you can send a message to the lock holder. If that doesn't work, you can either abort the command or have someone go to the workstation that holds the lock to release it. If the workstation is running a long report that won't finish quickly, you still have the option of aborting your change and making it later. In all cases, the second user has good knowledge about what the problem is and what the options are for handling it.

Once established, the On Neteror procedure remains in effect for all commands. Concurrent Browsing of a database is possible because multiple users lock records only when they make a change to the data, or when they press the Ctrl-O combination to explicitly lock a record. Changes made

by other users show up automatically on your screen as you Browse through the database.

Other improvements over the *dBASE III Plus* language include prompted filenames. All commands that require filenames will accept a question mark or wildcards in place of an actual filename. When the command executes, a window pops up that shows existing files matching the specification. You can then select the file from the window by pressing Enter.

#### ENHANCED COMMUNICATIONS

At the heart of *dBXL/LAN*'s enhancements lies improved communication between workstations. *Networker Plus* is a \$259 set of utilities that handle user identification and communication between LAN workstations. *Networker Plus* comes bundled with *dBXL/LAN*, although it is also available as a separate purchase from WordTech and will run in conjunction with most other DOS application programs.

Installation of *Networker Plus* consists of copying two disks of utilities to the file server and optionally to the workstations. NetBIOS is not required for multiuser access to the database, but it is required to ac-

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# Across The Line.

cess the interworkstation communication capabilities. So plan on using NetBIOS or the NetBIOS emulator that comes with your network operating system.

The LAN.LOG file in *Networker Plus* keeps track of the active LAN.COM users: if a user fails to log out, LAN.LOG will continue to show him active. Messages sent to an inactive user will result in an error. The memory-resident Dialog utilities found in *Networker Plus*, such as Dialog, Chat, and Send Screen, occupy between 12K and 20K of RAM. It's recommended that you load LAN.COM and then the memory-resident utilities before loading *dBXL/LAN*.

#### WORKING WITH NETWORKER

Using *Networker Plus*, you can send and receive tasks, messages, and screens to and from other workstations. *Networker Plus* offers the option of immediate or delayed delivery, as well as sending to one or more workstations. Workstations need not be active when sending a delayed delivery message.

The recipient can disable or queue up incoming messages for later viewing; queued files store messages and tasks that

a workstation has not yet displayed. Some weaknesses in NetBIOS and the LAN.LOG file could make message sending unreliable, though. For instance, NetBIOS can pass messages along to a user only when he updates his screen. Also, users who don't log out before turning off the system will still be registered as active by LAN.LOG, so that other users may continue to try to send messages. In addition, there is no way for a user who is checking a list of LAN.COM users to know that someone he wants the message sent to is not using NetBIOS and therefore unable to receive it.

The ability to send tasks to other workstations and use the processing power of those workstations allows database users to distribute their workload. A user with several long reports and updates could send the tasks to various idle workstations to be completed there while he works on another project at his own workstation. A network of 8088 and 80286 machines might benefit by dedicating an 80386 machine to receive and process tasks, such as long reports and massive updates.

*Networker Plus*'s ability to send screen images is useful for debugging problems, as well for applications where screen information must be shared or approved. The programs also allow the capturing of a screen from another workstation, but you can prevent this monitoring activity through the Set Snoop Off command.

#### COMPATIBILITY AND SECURITY ISSUES

Compatibility with *dBASE III Plus* carries with it certain weaknesses. The explicit RLOCK() and FLOCK() functions of *dBXL/LAN* are the same as in *dBASE III*. While FLOCK() works fine, permitting users to put an exclusive lock on an entire file, RLOCK()'s record locks are not additive, and you are limited to locking one record at a time.

Another weakness in *dBXL/LAN* is a lack of database security. It is easy to program user names and passwords into a *dBXL/LAN* application, but it is also easy to list, copy, or export an unprotected .DBF file from the DOS or the XL prompt. Sensitive applications would do best to rely on the network operating system file security for the primary protection of files.

Other complaints are minor. Just as in

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can hook up a PC  
in a couple of minutes.



*dBASE III Plus*, case sensitivity is always active. This forces programmers to convert both arguments to UPPER() to ensure a case-insensitive match. Also, since *dBXL/LAN* lacks a Range or Between command, you'll have to program using very inefficient compound expressions such as NAME GE C\* AND NAME LE D\*.

Network performance during our performance tests showed *dBXL/LAN* to be slightly faster than *dBASE IV* on some tests but much slower on others. Network use during performance tests 3 and 4 reached as much as 75 percent, indicating a high level of network activity that could present problems for networks with more than five workstations.

*dBXL/LAN* is a reasonably priced alternative to *dBASE III Plus* and LAN Packs. The automatic record-locking and messaging capabilities exceed that of *dBASE III Plus* and *dBASE IV*, and there is good support for WordTech's *Quicksilver* compiler, as well as third-party screen and program generators. With released products and solid plans to support virtually all major SQL engines, *dBXL/LAN* can serve as a very flexible way to extend your *dBASE III* programs into the future.

## Paradox 3.0

by Catherine D. Miller

Calling a multiuser database both powerful and easy to use sounds like a contradiction, but *Paradox 3.0*, in combination with the *Paradox LAN Pack*, proves that this doesn't have to be the case. At \$725 for *Paradox 3.0*, plus \$995 for the *Paradox LAN Pack* (which adds five additional users), Borland's relational database delivers a lot of bang for the buck.

*Paradox 3.0* is a vast improvement over *Paradox 2.0*. In addition, the *Paradox LAN Pack* extends the network features of its predecessor, *Paradox Network Pack*, considerably, making *Paradox 3.0* especially well-suited for multiuser environments. As demonstrated by the impressive benchmark-test results, *Paradox* doesn't sacrifice speed while maintaining data integrity among multiple users.

The *Paradox LAN Pack* lets you integrate *Paradox 3.0*, *Paradox 2.0*, *Paradox OS/2*, and *Paradox 386* on the same network. This means users of the various ver-

sions of *Paradox* can share files, tables, and records.

On its own, *Paradox 3.0* (reviewed in *First Looks*, *PC Magazine*, March 28, 1989) includes a hearty programming language called PAL (*Paradox Application Language*), a Data Entry Toolkit to design forms and interfaces, the Personal Programmer application generator, cross-tabulation and graphing capabilities, and the powerful QBE (Query by Example) to extract and consolidate data from a group of records or tables.

Using the program on a network is essentially the same as using the standalone version. All commands and features available in the single-user version are functional on a network. And many data-protection features are transparent to the user. Although PAL and the *Paradox Personal Programmer* furnish many tools for creating multiuser applications, virtually all multiuser features are available without programming by selecting the items from the program's extensive menu system.

### MAINTAINING DATA INTEGRITY

The ability to lock files, records, and tables allows simultaneous access to data while

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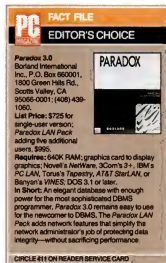


ensuring data integrity. *Paradox* supports several types of locks offering different levels of restriction on concurrently shared tables. The most restrictive type of lock, Full Lock, gives you complete access to an object while stopping others from getting to it. Alternatively, Prevent Full Lock precludes anyone from imposing a Full Lock, promoting maximum concurrent use of data. A Write Lock allows access to an object but forestalls others from changing its structure or data; Prevent Write Lock prevents users from placing either Full or Write Locks on an object.

Family Locks, Record Locks, and Form Locks have the same data-access level as a Write Lock; they prevent other users from changing objects in a table's family (forms, reports, validity checks, and image settings), records and forms, respectively.

*Paradox* automatically (implicitly) locks reports, forms, tables, records, and files when they are being used by a workstation. Implicit locks don't restrict the access of the person using the object—only the access of other network users. Whenever you perform a database operation, *Paradox* chooses a level of locking for that operation. Although *Paradox* does a good job choosing the appropriate level of locking for each database operation, you may want to impose explicit locks in specific instances for custom applications. Explicit locking is available by choosing the Tools/Net/Lock menu selection or by using the PAL Lock command. But, use explicit file locking sparingly since it can interfere with automatic file locking.

If you need to get to a locked object, the Tools/Info/Lock menu selection will tell you the types of locks that are active on the



object and the name of the person who has locked it. This can be important because different types of locks cannot necessarily coexist: a Full Lock is not compatible with any other type of lock, while a Prevent Full Lock is compatible with both Write and Prevent Write Locks. For example, if someone on the network has a Write Lock on an object and you want to perform an operation that requires a Full Lock to be placed on the same object, you will have to wait until the current lock is released.

An editing feature specifically designed for network users, the Modify/Coedit menu option allows maximum simultaneous access to the table you're editing.

While choosing the Edit option automatically places a Full Lock on the table(s) you are editing, the Coedit option applies a Prevent Full Lock to the table(s) and locks only the records being changed. This means several users can edit different records within the same table at the same time. Other workstations trying to modify a locked record will receive a message that the record is locked and will be denied access. As you complete your changes to each record, the new version is written to disk.

By placing multiple images of the same table on the screen, the Coedit option allows you to lock as many as four records in one table simultaneously. This also makes it easy to transfer data between different records in the same table.

Another nice feature on the network is Refresh, which shows the results of updates performed on other workstations.

In *Paradox*, two kinds of passwords can be created for each table.

With the AutoRefresh menu selection, available from the Coedit menu, you can adjust the update interval from 1 second to 1 hour or disable AutoRefresh entirely. Refresh is automatically activated when you try to update or lock a recently changed record.

#### SECURING YOUR DATA

An important aspect of sharing data on a network is the level of password protection and the restrictions on accessing data in a table—in short, data security. You can select protection capabilities by choosing the Tools/More/Protect option, restricting other workstations' access to your tables, forms, reports, and scripts.

Two kinds of passwords can be created for each table: owner passwords and auxiliary passwords. Once you have encrypted a table with an owner password, access to it (and its family) is limited to those auxiliary passwords you define.

Auxiliary passwords allow for five levels of access to the table. By choosing to make access ReadOnly, the user can view



*Paradox* is multitable, multirecord forms maintain referential integrity on a network. When in Coedit mode, records are automatically locked, and auto-refreshing updates the data changed by others.

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BYTE AWARDS

tirely. As for speed, Fastback Plus is ready for the next backup diskette before you finish labeling the one you just removed.

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#### Fastback Plus

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**PC WORLD**

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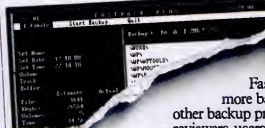
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### PC HANDS ON

BY EDWARD MENDELSON

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only the table. An Update-level access lets the password holder change non-key fields but not insert or delete records or change key fields. By selecting Entry access, the ability to enter new records is added to the privileges of the Update password. InsDel lets the user insert and delete records and empty the table, while All gives the user complete rights to the table, including the capability to restructure or delete it.

As the owner of a table, you can also control the access of other workstations to each field in the table. Only three levels of field access rights are available when you assign auxiliary passwords. If you choose

Borland is currently working on *Paradox-SQL*, which will serve as a front end to SQL servers such as IBM OS/2 Extended Edition.

None as the level of access to a particular field of a table, that field will be hidden whenever the table is displayed. The Read-Only option allows the user to view the values in the field but not to change them, while All lets the user view and change the field's values.

One potential problem with the way *Paradox* makes passwords available from the menus is that anyone can create an owner password for a currently unclaimed table. Instead of relying on your memory to select the menu option to encrypt a table, it would be helpful if the program automatically requested that you choose whether you will establish an owner password when you create a table.

If you decide the issue of password protection is better left to the network administrator—which is the case in most network environments—the *Paradox* Protection Generator allows the administrator to orchestrate the protection of shared tables. This program allows you to create a protection system for the entire network or for specified groups of tables. Individual protection systems, in which

each user logs in with a password and then has particular access rights, can be built for each *Paradox* application on the network.

#### PAL-ING AROUND

Although the *Paradox* Personal Programmer doesn't have the tools you need for adding multiuser capabilities, adding multiuser features with PAL commands is straightforward. PAL includes all the tools an applications developer will need to create a DBMS that runs effectively on a network. For example, the PAL Lock and Unlock commands allow you to explicitly lock and unlock tables, thus controlling access to sensitive data. While the Coedit command, used to edit a table in a multiuser application, manages automatic record-level locking, you can opt to use the LockRecord and UnlockRecord commands to explicitly control these functions.

Because multiuser databases can be quite complex, good documentation can make all the difference. The documentation that comes with *Paradox* is quite readable and well organized, with extensive references to network functionality in all manuals. For example, the types of locking automatically used for each operation are discussed for each menu selection.

The *Introduction to Paradox* manual includes a comprehensive tutorial. Used in conjunction with the examples found on the *Paradox* disks, even the newcomer to database functionality will easily learn the basics of *Paradox*. *Paradox User's Guide*, the general reference for the program, includes a glossary and list of error messages in addition to detailed information about all *Paradox* commands and features.

The *Paradox Network Administrator's Guide* describes installation and maintenance of *Paradox* on a network. Two other manuals, *Guide to the Paradox Personal Programmer* and the *PAL User's Guide*, are also included with the program. *PAL User's Guide* devotes an entire chapter to the creation of multiuser applications and another section to setting up facilities for password protection.

We found *Paradox* 3.0 to be relatively easy to install on a LAN, since the Install program automates most of the procedure for you. You need only define network directories for the program and data, set the paths necessary on your network to make *Paradox* available to the workstations, and create a private directory with a PARA-

DOX3.CFG file on each workstation. The *Paradox Network Administrator's Guide* gives explicit instructions for carrying out each of these steps, as well as suggestions for creating workstation log-in scripts for all the networks *Paradox* supports. Once installed, all LAN security measures can be set from within the program via menu choices.

In its present incarnation, *Paradox* 3.0 doesn't have SQL services or hooks. Borland is currently working on *Paradox-SQL*, which will serve as a front end to SQL servers such as IBM OS/2 Extended Edition. Since *Paradox-SQL* will add QBE to SQL translations, you won't have to learn SQL to make use of its distributed processing capabilities.

Although *Paradox* offers many important network features, there is one notable omission: lack of data-recovery features in the event the LAN should crash.

However, *Paradox* continues to increase its functionality with each revision. *Paradox* 3.0, in conjunction with the *Paradox LAN Pack*, offers some fine network capabilities while automating the process of protecting data and ensuring data integrity. Its power, performance, and ease-of-use are a winning combination.

## R:BASE for DOS

by Alfred Poor

*R:BASE* is one of the graybeards in the PC database market, having been around at least as long as the IBM PC itself. In its current incarnation, Microrim's *R:BASE for DOS* lists for \$725 and comes in a stack of ten 5¼-inch disks (or six 3½-inch disks).

Database programs are built around different design philosophies. In the case of *R:BASE*, one underlying principal is that the major program elements exist as separate entities, many of which can be run as standalone executable modules. In addition to the main program, there are modules for data import and export, a text file editor, and a procedure file compiler.

The main program includes a number of interesting and useful modes. One unusual feature of *R:BASE* is that the interactive prompt changes depending on which mode you are using at the time. For example, the "R>" prompt is the main program command prompt. An "H>" signifies that you are in the help module,





In this use of the Prompt by Example interface of *R:BASE* for DOS, the query is being assembled in the top box. The middle box offers the next available options; Done has been selected. The box at the bottom lists the selection criteria as they have been specified.

"D>" means database definition, and "I>" and "W>" show that you are in the middle of an If or While loop, respectively. *R:BASE* is one of the few programs that permits you to enter multiple commands that include conditional processing such as If and While from the interactive command prompt.

The main program also has a number of features that are intended to make it easier to use. For example, there is a Prompt by Example function that steps you through the use of the various commands. You respond to a series of menu prompts, and when you are finished, the resulting command line is displayed on a box on the screen. At this point you can choose to execute the command or edit it. The prompt-

ing system is easier to use and more bullet-proof than in older versions of *R:BASE*.

The main program also offers an Express module that is used to create data entry forms, report formats, and even custom menu procedures for applications. Express is a code-generating feature that lets you edit the procedures it creates. The report function is not as strong or as easy to use as in some competing products, but in most cases, it will get the job done.

#### VARIETY PACK OF FEATURES

*R:BASE* has a variety of interesting features and functions. For example, in addition to the normal Select and Browse commands, it has some useful statistical commands. Many programs allow you to add the total value of a list of fields, or count the number of records, but *R:BASE* goes even further. In addition to handy commands that produce standard deviations and variance, you get commands that will count the number of unique values in a given field (such as the number of states represented in a mailing list) and crosstab two fields (such as a table of the number of employees in each of three departments across five separate locations).

The program also has a Zip command. This is similar to functions found in other products reviewed here in that it lets you run any other program from within *R:BASE*. Unlike the others, however, there is a Zip Rollout option that dumps all but 15K of *R:BASE* from your system memory so that you can run almost any program without having to dump *R:BASE*. When you exit the other program, *R:BASE* reloads itself. As a result, you can get at

even the largest programs, including your favorite word processor, quickly and painlessly.

Another unusual feature of the program is that it does not use any record locks. The program locks the entire data table whenever a record is added or updated. The lock is only in place briefly, however, thanks to an interesting design feature. Rather than lock a record the entire time that a user is modifying it, *R:BASE* keeps a copy of the original record when a user asks to change it. Then when it comes time to write back the changes, the program first compares the old version with the current version. If the two match, then the updates are written to the server. If the two records do not match, however, the program realizes that other changes have been written since the record was first accessed and cancels the update.

Installation is straightforward and easy. The files on the distribution disks are compressed, but the installation routine takes care of installing and expanding them.

Since *R:BASE* has such large .EXE files and overlay files, you can improve performance by keeping some of these on a local storage device.

Like many other programs in its league, *R:BASE* supports both single and multi-user installations with the same package. The program permits up to three users with a single package; six-user and unlimited-user versions are also available.

Since *R:BASE* has such large .EXE files and overlay files, you can improve performance significantly by keeping some of these on a local storage device. According to a Microrim representative, allowing about 400K of RAMdisk or hard disk storage to store the most often used code is enough to make a difference. This storage eliminates the need to retrieve the

**FACT FILE**

**R:BASE for DOS**  
Microrim Inc., 3925  
159th Ave. NE,  
Redmond, WA 98052,  
(206) 885-2000.  
List Price: Three-user  
package, \$725; six-user  
package, \$995,  
unlimited users, \$2,695.  
Requires: 640K RAM; dedicated server (local  
hard disk or RAMdisk recommended). Novell's  
Advanced NetWare, 3Com's 3+, or IBM's PC  
LAN, DOS 3.1 or later.  
In Short: *R:BASE* has all the features you might  
want in a database, but they are implemented in a  
way that is resource-hungry and slow to perform.  
The unusual design philosophy also means that  
you have to learn some fundamentally different  
ways of coding procedures and structuring files  
compared with what competing products require.

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same instructions repeatedly from the server using the comparatively slow network.

#### DEFICIENCIES, ECCENTRICITIES

*R:BASE* is not without its warts, however. One problem is that it is not consistent. For example there are on-line help screens on

a variety of topics in most modules, but there is no help at all available within *RBEDIT*, the text editor.

Programming is not easy. The Express modules do a good job of programming simple applications, such as nested custom

menus that call on standard command operations, but the resulting code is bulky and editing to make small changes can be rather tedious.

More important is the fact that you need to relearn many techniques you might have developed when using competing products. For example, many database programs offer a record pointer for each data table so that you can control the processing of individual records carefully. *R:BASE* offers only three pointers per database, so you will have to be clever about how you use them. One potential advantage is that you can apply two pointers to the same table, which does let you be in two places at once, so to speak.

There are other unusual concepts in this package. *R:BASE* does not maintain indexes like most programs, but you can specify any field to be a "key field," which means that an index is maintained for that field. You can name all 800 fields in a table to be key fields, which is a plus. In order to create a compound index, such as one on a first name and last name, you must create a new field that is calculated. Define the new field as the two other fields concatenated, then make it a key field, and



#### EDITOR'S CHOICE

- DataEase
- Paradox

If raw multiuser speed is what you're after, *Paradox* is your package; it conquered its competition in the PC LAN Labs LAN performance testing. Its success is due in no small part to the customizability of its *Paradox* Application Language. A key to success for any LAN software is its ability to be optimized for the specific network on which it will run. *Paradox* is well supported in that department. The main drawback to *Paradox* is that in some ways, it strays from the database conventions with which

you're probably familiar. *DataEase*, which was the second fastest performer in many of the performance tests, stays much closer to database norms.

If you grew up talking in terms of normalized tables, indexes, fields, and records, *DataEase* may be more your style. The program is surprisingly easy to use given its power, it has an incredible report generator, and its procedural language is prompted, which makes it more user-friendly than *Paradox*'s.

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you have a compound index. It's a little complex, but it works.

*R:BASE* also does strange things to its database files; they are not separated into individual DOS files, as is the case with many other programs. Instead, all tables are stored in a family of three \*.RBF files. These contain the database structures and all the data. The only information they keep separately are the procedure files that you might write. The end result is that you must rely on *R:BASE* to manage your tables. You cannot just use DOS to copy a table or two to keep them safe before trying out a major update procedure; you must use the *R:BASE* utilities and commands for these tasks.

The idiosyncrasies of the program might be easier to overlook were it not for the performance figures. *R:BASE* came out slowest overall in the benchmark tests, a generalization that holds across the full range of from one to five concurrent workstations. It turned in its best relative times on the sequential searches and the global update but did quite poorly in the indexed procedures and record update tasks. Even if the times were cut in half by storing major hunks of program code on a local hard

*R:BASE* offers a reliable approach to database management on local area networks, but not without exacting a price.

disk or RAMdisk, *R:BASE* would still place last in most of these instances.

#### STILL TO COME

*R:BASE*, Version 3.0, scheduled to ship in October, will have a completely overhauled pull-down-menu object-oriented interface. In addition, Version 3.0's Query by Example will let users look at, edit, and

query databases all in the same menu. Quick Forms and Reports will be based on several commonly used default forms and reports that will allow users to input data and view information with just two or three quick keystrokes. Version 3.0 will also have a full implementation of SQL embedded directly in the product, ensuring transaction processing with full Commit and Rollback.

In the final analysis, the current version of *R:BASE* offers a cost-effective and reliable approach to database management on local area networks, but not without exacting a price in other areas. Its unusual design, the need to work around simple tasks like multiple-field index keys, and its slow performance make it less attractive than some of its competitors.

*Greg Campbell is an R&D program manager for the federal government in Washington, D.C. He is also a private consultant specializing in LANs, artificial intelligence, and database systems. Catherine D. Miller is a staff writer at PC Magazine. Alfred Poor is a Pennsylvania-based microcomputer consultant and a frequent contributor to PC Magazine.*

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NortonSI 18.7 • Landmark™ 18.3MHz  
512K, 1.2MB or 1.44MB Drive, 101-Key-board

#### Standard System Features:

- 80386SX Processor Operating at 16MHz delivering 18MHz Effective Throughput
- 512K RAM expandable to 8MB on the System board using 256K and/or 1MB 80ns RAM
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80387SX Co-Processor Support
- AMI BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM, and PCNET compatibility
- 8 Slot motherboard design (5 16Bit & 3 8Bit)
- Medium foot print case with 5 Disk Drive bays (Shown with optional Mini Size Tower • Case)

#### Options:

- Full or Mini Size Tower • Case • Factory Installed RAM Upgrades
- Custom configurations w/Name Brand peripherals of your choice
- Compaq® Style LCD or Plasma Portable

#### Standard Pre-Built Configurations:

386SX-16 w/512K, Hard Disk Drive, Monitor & Video Card						
Drives	40MB-40MB	40MB-20MB	71MB-10MB	110MB-20MB	150 17MB	320-10MB
Video	1:1 RLL	1:1 MFPM	1:1 RLL	1:1 RLL	1:1 ESDI	1:1 ESDI
Mono	\$1507	\$1607	\$1852	\$1972	\$2637	\$2937
VGA/Mono	\$1702	\$1802	\$2047	\$2167	\$2832	\$3132
EGA	\$1847	\$1947	\$2192	\$2312	\$2977	\$3277
VGA/16Bit	\$1937	\$2037	\$2282	\$2402	\$3067	\$3367

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**PC Magazine** Feb. 14, 1989

## PC BRAND 386/20 \$1649

## PC BRAND 386/25 \$1849



20 MHz Clock, Zero Wait Operation  
Norton SI 23.0 • Landmark Speed 26.1MHz  
1024K, 1.2MB or 1.44MB Drive, 101-KeyBoard

### Standard System Features:

- Intel 80386 Processor Operating at 20MHz with Zero Wait States in Interleave mode delivering 26.1MHz Effective Throughput
- 1024K RAM standard expandable to 16MB via 32Bit RAM boards using 256K and/or 1MB 100ns RAM
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller, 977.6 KB/SEC Caching Controller w/ESDI Configurations
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287, 80387 Co-Processor Support
- Phoenix BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM and PCNET compatibility
- 8 Slot motherboard design (5 16Bit & 2 32/8Bit)
- Medium foot print case with 5 Disk Drive bays

### Options:

- Full or Mini Size Tower • Case • 8MB 32Bit RAM Card Upgrade
- Custom configurations w/Name Brand peripherals of your choice
- Compaq® Style LCD or Plasma Portable • Weitek Co-processor

### Standard Pre-Built Configuration:

386/20 With 1024K, Hard Disk Drive, Monitor & Video Card					
Drives	40MB-28MS 1:1 MFM	71MB-18MS 1:1 MFM	110-28MS 1:1 MFM	130-17MS 1:1 ESDI	320-16MS 1:1 ESDI
Mono	\$2155	\$2280	\$2460	\$3010	\$3455
VGA/Mono	\$2340	\$2465	\$2645	\$3195	\$3640
EGA	\$2445	\$2570	\$2750	\$3300	\$3745
VGA/16Bit	\$2585	\$2710	\$2890	\$3440	\$3885



25 MHz Clock, Zero Wait Operation  
Norton SI 28.2 • Landmark Speed 33.6MHz  
Norton SI 31.6 • Landmark Speed 43.5 w/Cache  
1024K, 1.2MB or 1.44MB Drive, 101-KeyBoard

### Standard System Features:

- Intel 80386 Processor Operating at 25MHz with Zero Wait States in Interleave mode delivering 34 to 44 MHz Effective Throughput
- 1024K RAM standard expandable to 16MB via 32Bit RAM boards using 256K and/or 1MB RAM
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive controller, 977.6 KB/SEC Caching Controller w/ESDI Configurations
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80287, 80387 or Weitek Co-Processor Support
- AMI BIOS with full MS/DOS, OS/2, XENIX, NOVELL, 3COM and PCNET compatibility
- User configurable I/O timing permitting compatible operation with older peripherals or faster I/O for newer devices
- 8 Slot motherboard design (5 16Bit & 3 32Bit & 2 32Bit)
- Medium foot print case with 5 Disk Drive bays

### Options:

- 32KB or 64KB Cache Processor • Weitek Co-processor • Tower • Case
- Custom configurations w/Name Brand peripherals of your choice
- Compaq® Style LCD or Plasma Portable • 8MB 32Bit RAM Card

### Standard Pre-Built Configurations:

386/25 With Hard Disk Drive, Monitor & Video Card					
Drives	40MB-28MS 1:1 MFM	71MB-18MS 1:1 MFM	110MB-28MS 1:1 ESDI	130-17MS 1:1 ESDI	320-16MS 1:1 ESDI
Mono	\$2362	\$2407	\$2732	\$3387	\$3667
VGA/Mono	\$2577	\$2822	\$2947	\$3602	\$3902
EGA	\$2722	\$2967	\$3092	\$3747	\$4047
VGA/16Bit	\$2812	\$3057	\$3182	\$3837	\$4137

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**386/33 CACHE \$2799**

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## 33 MHz Clock, Zero Wait Operation

Norton SI 45.9 • Landmark 58.7 MHz w/32K or 64K Cache  
1024K, 1.2MB or 1.44MB Drive, 101-Key Keyboard

### Standard System Features:

- True 33 MHz INTEL 80386-33 CPU operating with Zero Wait States  
Delivering up to 58.7 MHz Effective Throughput
- Intel 82385-33 Cache Processor with 32K SENS Static RAM Standard,  
Field Upgradable to 64K
- 1024K RAM Standard Expandable to 16MB
- 1.2MB 5.25" or 1.44MB 3.5" Diskette Drive
- 1:1 Interleaving Dual Hard Drive/Floppy Drive Controller,  
977.6 KB/SEC Caching Controller w/ESDI Configurations
- Enhanced 101-key AT Style Keyboard
- High Capacity 200 Watt System Power Supply
- Real Time Clock/Calendar with 5 Year Battery
- 80387 or Weitek Co-Processor support
- Phoenix BIOS With Full MS/DOS, OS/2, XENIX, NOVELL, 3COM  
and PCNET compatibility
- 8 Slot motherboard design
- Full size case with 5 Disk Drive bays  
(Shown with Optional Full Size Tower @ Case)

### Options:

- Custom configurations w/Name Brand peripherals of your choice
- Weitek Co-Processor • Tower @ Case • Factory Ram Upgrades

### Standard Pre-Built Configuration:

386/33 With Hard Disk Drive, Monitor & Video Card						
Drives	40MB-20MB 1:1 MBM	71MB-38MB 1:1 MBM	102MB-25MB 1:1 MBM	102MB-17MB 1:1 MBM	102MB-11MB 1:1 MBM	40MB-17MB 1:1 MBM
Video						
Mono	\$3309	\$3554	\$3679	\$4334	\$4634	\$6539
VGA/Mono	\$3504	\$3749	\$3874	\$4429	\$4829	\$6734
EGA	\$3649	\$3894	\$4019	\$4674	\$4974	\$6879
VGA/16MB	\$3739	\$3984	\$4109	\$4764	\$5004	\$6969

\* Norton SI 3.0

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Calendar Standard

### Standard Pre-Built Configuration:

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20MB		\$2035	\$2240	\$2390	\$2890
40MB		\$2175	\$2380	\$2530	\$3030
71MB		\$2375	\$2580	\$2730	\$3230
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3200; EGA, 80386-12, 1MB, 40MB HD, FDD .....	\$3595
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AUM-1381 14" Diamond Scan .....	499
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CPD1304 14" 25DP (1024x768) Multiscan .....	\$689
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When your dedicated line goes down, V.3225 is the ideal dial back-up

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To learn how the V.3225 can squeeze more from your datacomm system, contact Universal Data Systems, 5000 Bradford Drive, Huntsville, AL 35805. Telephone 205/721-8000; FAX 205/830-5857.



**V.3225**  
QUANTITY ONE PRICE:  
**\$1145**



Universal Data Systems



MOTOROLA INC.

## LAN ACCOUNTING SOFTWARE:

Up to Speed  
on the  
PC Platform

PHOTO ILLUSTRATION JAMES NAZZ

**We reviewed eight  
leading accounting  
packages for  
their ability to serve  
an enterprise's  
management and  
accounting needs. Can  
any of them replace  
a mini-based system?**

by Lee Thé

"I'm not one of our bean counters—why should I get involved with an accounting software purchase decision?" says one person.

"I don't need accounting software—I run a department in a major corporation, not my own company," says another.

"We've grown to a thousand employees. Strictly mini territory," says a third.

A few years ago, they would have been right. But since *PC Magazine's* last single-topic issue on accounting (September 15, 1987), some new trends in LAN-based accounting software have been rapidly changing the situation. Accounting software packages are becoming enterprise management software. They still keep the books, but they also furnish timely, vital data that everyone can use without compromising the security and efficiency of the core accounting functions.

The eight packages we've evaluated are *AccPac Plus*, *Data Pro Accounting Series*, *Great Plains Accounting*

## BUILDING A SUCCESSFUL LAN ACCOUNTING SYSTEM

by Timothy Lee, Herbert Mudie, and Greg Winnett

At Price Waterhouse we've designed, evaluated, and installed many state-of-the-art automated financial management reporting systems. Here's our ten-step guide to building a successful LAN-based accounting system.

### 1 Determine your goals.

Define your company's goals for the next year. You should be able to state them in a few brief sentences. Profit, revenue, or market-share targets set the stage for forming your business objectives. Know what your company is trying to achieve in clear, concrete terms.

### 2 Know your objectives.

Objectives are measurable actions taken to achieve your goals. For example, "Increase inventory turnover from four times to six times a year." In order to pinpoint objectives, it is important to realize where your profits come from. Find out which customers and inventories are your greatest profit centers.

Identify your "critical success factors." What key factors are most crucial to the realization of your stated objectives and goals? Investment of your cash, equity, and trade credit should support these factors.

### 3 Understand your players.

Understanding your personnel is important in order to help them increase their strengths and overcome their weaknesses. Information is also a key player in managing your business. Determine what information could make you more effective in addressing the critical success factors you have identified. (Helping to generate this information should be one of the functions of your automated system.)

### 4 Develop your overall game plan.

Develop your information systems strategy and plan for the whole game, not just a 2-minute drill. Determine which information systems can deliver the information you identified in step 3. Avoid pitfalls based on four common myths.

● *Myth: A poor manual system will be improved by automation.*

Developing procedures and policy is equally necessary in an automated system and in a manual system. When overlooked, faulty procedures become the most frequent causes of system failure.

● *Myth: A wise systems developer will interview all users in advance.*

It's important to understand an individual's needs in your firm, but a long analysis process can overwhelm the business of getting a solution implemented. Spend your time wisely.

● *Myth: You should automate as much as possible.*

Pareto's Rule (the old 80/20 principle) holds here. Be prepared to make compromises; you can take care of 80 percent of your needs at 20 percent of the cost of a "total" system. Automation of the remaining tasks becomes inordinately expensive because of the customization required. Therefore, you should not expect to eliminate all manual tasks, but your procedures can be revised as you reach new stages in the implementation.

● *Myth: Hardware is the greatest expense.*

Item	Perception	Reality
Hardware	60%	20%
Software	20%	10%
Outside help	5%	15%
Internal costs	5%	45%
Maintenance	5%	5%
Supplies	5%	5%

*Series, Macola, Platinum Series, Real-World Accounting System, SBT Database Accounting Library, and Solomon III.* All were chosen for their robustness and their proven multiuser functionality (albeit at varying levels). The group represents a large portion of the high-end market, and it highlights the wide spectrum of programming languages used for accounting: C, COBOL, BASIC, Pascal, and dBASE. We also invited State of the Art to submit M.A.S. 90 for testing, but the company declined. For a look at other interesting products not reviewed here, see "Up and Coming in Accounting."

New uses for accounting packages include ad hoc and scheduled reporting to managers throughout a company, as well as operations support—on-line support for a telemarketing group, for example. All of

these tasks require reports quite different from conventional accounting reports. Ad hoc inquiry also demands an interface sophisticated enough to accommodate users who don't access the system every day.

Management reporting can't be expected to conform to regular accounting periods. It may mix data from multiple modules, as well as posted and unposted data. Most management reporting data comes straight from the modules rather than from the general ledger. One example would be the cash position for the next two weeks from today.

At the same time, audit trail requirements mandate keeping the management reporting separate from the types of reporting required by government and financial institutions.

Enterprise management accounting

puts the system at far greater risk than old-style accounting—especially if your operations support includes on-line system updates. But it can be done correctly; it just requires more sophisticated software.

### FROM IDEALS TO REALITY

None of the packages reviewed here has fully achieved enterprise management software status, especially when it comes to ad hoc inquiry. But several of the programs—particularly *Platinum* and *Macola*—can be customized to provide such a system. Others, such as *AccPac Plus* and *Great Plains*, furnish management-reporting options that point in the right direction without requiring the expensive ministrations of programmers.

Having these capabilities doesn't necessarily make these systems better at ac-



Internal costs include initial training and the cost of your workers' time. Effective use of outside help can make this investment more productive. Outside assistance is also important because many professionals do not have the time or personnel to assess their data processing requirements properly. This process is particularly critical when you are considering a local area network or larger multiuser system.

### 5 Prepare the fundamental moves.

It is now time to review the basic elements of an automated accounting system. Publications available from your local chapter of Certified Public Accountants can help you understand the capabilities and benefits of such a system.

When to automate? Consider it if you

- have more than 50 transactions related to a particular accounting function during the month;
- have more than three clerks in any single financial record-keeping area;
- spend over \$500 a month for a service bureau;
- have processing requirements that are a good fit with an unmodified commercial software package.

When automation looks feasible, perform a quick evaluation by read-

ing software reviews and examining potential selections. After narrowing down the list of possible choices, do an in-depth evaluation. Make sure that the package you buy meets your specific requirements and matches your style. In selecting the right system, look for value, not the lowest cost.

### 6 Execute carefully.

When it's time to implement your information systems strategy:

- Prepare the users with a kickoff meeting and training so that they understand their roles and responsibilities.
- Prepare the site. Make sure there is adequate electrical power and ventilation; avoid excessive dust and extremes of temperature.
- Notify your insurance carrier.
- Install the hardware and software.
- Design the security system and backup methods you will use. Here you can take advantage of the features in the accounting packages as well as standalone hardware or software.

### 7 Practice.

It is often advisable to establish a set of books for systems training. The exercises should include proper closedown procedures, backup procedures, cross-training responsibilities, and security.

### 8 Stick to the plan.

Be patient. Develop a sensible and controlled method for converting your manual data. Often professionals run two parallel systems, maintaining both a manual and an automated system until they are convinced that both yield the same results.

### 9 Manage situations.

Enforce logging of procedures checklists. Some systems help automate recording of who performed what function and when. Ensure that proper backup procedures are executed.

Stay current with the newsletters from your accounting package's vendor. These should inform you of upcoming upgrades, improvements, or available fixes to the code. Be prepared for system growth by scheduling usage intelligently, purging records frequently, and periodically evaluating the efficiency of your system.

### 10 Evolve the system.

Conduct a review to evaluate what you've done well and what you could have done better. You should regularly be scouting for new features, new assignments, and even new personnel to help increase the payoff from your system.

counting than the others, but they're all at least competent in that area. Yet even as you read this, hundreds of old-style accounting-only packages are being introduced into firms like yours, mainly because the purchase decisions were left up to the bean counters. And why should the bean counters take your needs into account unless you tell them what those needs are?

Indeed, the effort to do so could produce a kind of company glasnost. Ordinarily departments tend to become isolated: managers forget that they all work for the same enterprise. But the process of choosing an accounting system should force everyone to sit down at the same table and start working out a synergistic business relationship, both between and within departments.

In fact, some firms start their decision

process by designing the management and accounting reports that everybody needs. Then they look for the accounting system that comes closest.

You need not be an accounting expert to use one of these systems for making business decisions. You just have to know what kind of information would help you do your job better, what form the information should take, and when you'll need it. Accounting systems have allowed smaller firms to operate with a level of decision support once found only in large corporations. The economies of scale are dwindling in general, and accounting software has joined that trend.

#### DEPARTMENTAL MANAGERS

Large corporations are also benefiting from accounting packages. Departmental

managers with profit-and-loss responsibilities need them, since tax-law changes have made it advisable to set up departments as profit-and-loss centers. At the same time, the trend toward decentralization has put more decision-making responsibilities into departments.

Such departments can operate their systems autonomously, feeding summary data into the corporate mainframe. For accounting purposes, many departments that don't directly produce profits can be set up in a way similar to the fund accounting used for nonprofit institutions.

Great Plains Software deserves credit for actually setting up a special accounting program, including product customization, for corporate departments. (Great Plains says, however, that most corporate customers wind up using the unmodified



## ACCOUNTING SOFTWARE: SUITABILITY TO TASK

These four aspects of accounting cut across all industries and are important criteria for software selection, depending upon your organization's ownership, executive management style, and culture. For each category of task, programs have been rated on a scale from 0 to 4:

- 0 = completely unsuited for the task,
- 1 = poorly suited for the task,
- 2 = fair for the task,
- 3 = good for the task,
- 4 = excellent for the task.

The preponderance of top scores reflects the high quality of the accounting packages we selected for review.

**General Accounting (GAAP)** is most important to publicly held companies or firms whose creditors require audited financial statements. The requirements of GAAP (Generally Accepted Accounting Principles) are published by the Financial Accounting Standards Board in Stamford, Connecticut. GAAP requirements apply to a number of procedures, such as methods of inventory valuation, treatment of depreciation for tax purposes, and the preparation of required financial reports.

## ACCOUNTING SOFTWARE:

Suitability  
To Task

	0	1	2	3	4
General Accounting (GAAP)				✓	
Financial Accounting		✓			
Enterprise Management Reporting					✓
Decision Support		✓			

**Financial Accounting** refers to the variety and quality of financial reports a package offers: sources and uses of funds, statement of changes in financial position, balance sheets, profit and loss statements, and so on. We have also considered the package's

ability to perform standard financial reporting for cost centers, divisions, and other companies.

**Enterprise Management Reporting** refers to the program's ability to make management information readily available in a simple form. This can include process management data, accounts of orders (with quantities and dollar amounts), records of goods shipped and received, cash flow statements, and sales commission reports.

**Decision Support** relates to action. It includes features that can help you save cash:

- cash management reporting;
- easy selection and payment of a single-vendor check;
- identification of available discounts;
- a scientifically based inventory control system;
- productivity statistics.

Decision support also includes features designed to help you maximize revenue:

- comprehensive sales analysis;
- tracking of customer information;
- inventory analysis that can lead to price changes based on demand.

product to cut maintenance costs.) The greatest savings come from not using a mini, with its \$4,000- to \$6,000-per-month maintenance costs.

## SO LONG, MINI?

In fact, minicomputer turf is eroding rapidly. One company bought a heavily customized *Macola* package and a Novell LAN for \$120,000, amortizing it in 18 months against the costs of the mini it replaced. The new system offered improved speed, flexibility, reliability, accuracy, and ease of training.

The eight packages reviewed here average about \$5,000 for the set of basic modules and a moderate number of user licenses. Some allow unlimited users per server; others try to nick you for every workstation. Be sure to price systems against the number of users you anticipate having. And remember that enterprise management takes into account many light users—something per-node pricing fails to account for.

Heavy customization could add up to \$30,000 to the initial price of your setup and more down the line as you change and refine the system. You might, for example, add a new product line or division or change a report because you didn't get it

exactly right at the beginning.

But that's all petty cash next to mini costs. And an accounting system gives you a decent interface to boot, though some of the mini-based micro packages in our review still have a ways to go. Just compare the rough edges of *Macola* with the elegance of *RealWorld*, both of which derive from the same mini-based system, *MCBA*.

## GREAT LAN PERFORMANCE

Great LAN performance is needed if you want to do enterprise management accounting—or even straight accounting for many users. Any kind of on-line updating obviously demands a lot of the system. So does basic scalability—the ability to add users with a performance degradation as close to linear as possible. You also want individualized user-access templates rather than the cruder access-level concept.

Enterprise management performance must be measurable in seconds and minutes, not in hours. This requires at least 286-based performance on the workstations and a 386 server—as was true of our test setup. Keep your XT's off the LAN.

Because enterprise management demands so much of the software, we developed a demanding test. It uses keyboard macros to simulate one or two dozen real

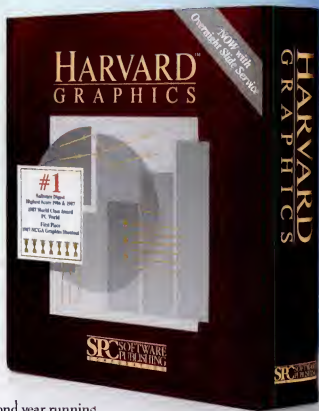
users, 70MB of data to simulate realistic loads traveling through the systems, and an order-entry test script that maximizes contention. It took at least 12 hours per package to test it after the software was installed and the database loaded.

There were plenty of surprises. For example, we always thought that record locking beat file locking, but it appeared to be faster only when a file-locking system locked the file at the moment of update.

Some of the products surprised us, as well—most notably *Solomon III*, which has received high ratings in many reviews. It shows that great single-user performance and impressive features lists don't always suffice for demanding multiuser operations.

We didn't test support directly, but we certainly got to see how well the vendors back their products during the tests. The Great Plains team won this contest easily, handling every glitch with aplomb. The *Great Plains Accounting Series* had a 32,000-account limit, which didn't come close to the 65,000 accounts in our test, so the company actually changed the product code to include an ample account-size option. Thus, the ultimate beneficiary of the PC LAN Labs testing is you; make sure the version you get has the higher account li-

# A Few Words From The World's Most Celebrated Graphics Software.



Thank you. For those of you who haven't heard, Harvard Graphics from Software Publishing has gotten a lot of recognition from the trade press. Why, you may ask? Certainly our crisp, high-speed output helped influence InfoWorld readers to name us Product of the Year. And the easy access to so many chart and graphing options must have helped PC World's audience give us their

World Class Award for

the second year running.

Actually it must have been all those things and more. Otherwise why would PC Magazine call Harvard Graphics "the de facto standard" software for business graphics?

Of course, the experts aren't the only ones who favor Harvard Graphics. In fact, with its growing popularity, Harvard Graphics has become the number-one selling business graphics software.

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mit. (*Data Pro* had a similar account limit but did not change it before testing began. A new, more powerful version of the package is due this fall.)

The Grace Under Pressure Award goes to Advanced Business Microsystems. Its emissary stoically endured not being permitted to configure certain Novell options that would have improved *Platinum's* performance but were disallowed so as to keep the playing field level. *Platinum* did, however, start out with the advantage of being optimized for *NetWare*.

#### PERFORMANCE POTENTIAL

If you used our tests on your own LAN, the results would surely differ. But then, that's why we ran them all together. Each product would probably perform differently on a different network. SBT, for example, wanted to add math coprocessors to all the CPUs, an interesting, if expensive, idea.

But the tests give a bottom line to each product's performance potential, and rac-

One warning  
about performance:  
sometimes speed  
comes at the cost  
of functionality.

ing improves the breed. Nearly every vendor said that it was changing its product in some way as a direct result of our tests—not just to beat the tests, but because none of them had ever had access to such a substantial test instrument before, even in their own labs.

One last warning about performance: sometimes speed comes at the expense of the functionality that you may need. For example, *Data Pro* ran swiftly but set a 32K account limit. Also, some of the products sacrifice speed in order to maintain comprehensive audit trails and other data safeguards, which is laudable. Just as a good automotive road test tells you what you give up in gas mileage and weight to have air conditioning, our tests give you a feel for the overhead needed.

Lee Thé is the West Coast editor of PC Magazine.

## AccPac Plus

by Mike Dixon, Timothy Lee, and  
Murtaza Mohamed-Taki

Five years ago, when an accounting package was considered exceptional if it could mimic a company's manual accounting system, *AccPac* was considered a strong program. In its latest incarnation, *AccPac Plus 5.0* (in general, \$795 per module) outdoes itself in its ability to do more than the basic accounting functions. Brought to you by Computer Associates, the world's largest publisher of computer software, the package ranks as a useful tool for management.

*AccPac Plus's* strength is that it allows users to modify the standard reports in its Order Entry and Inventory Control modules. In conjunction with the system's macro generator, you can design standard daily, weekly, and monthly reporting packages geared to specific managers' needs. The General Ledger's Report Writer is also a powerful reporting program that allows you to customize detailed financial statements and supporting schedules with up to nine columns reflecting dollar variations and percentage changes.

#### WINDOWING SYSTEM MANAGER

The Windowing System Manager (WSM), available from any screen by pressing the F3 key, lets you have up to ten different applications on the screen at the same time. For example, you can have the G/L (General Ledger) and A/P (Accounts Payable) screens available simultaneously in order to reconcile the subledger to the control account.

The system comes with a field-sensitive Smart Finder that lists available options for the current field based on the information you enter. For instance, if you want to input a supplier's name but are unsure of its exact spelling, the Smart Finder will locate the closest possible match.

A macro generator included with WSM offers a revolutionary approach to automating accounting procedures. Unlike external macro generators, this built-in facility intelligently handles the prompts and pauses within the accounting program. Imagine setting up a menu-driven macro that steps through appropriate screens for order entry, bypassing fields that do not require input. The macro can also identify input in specific fields that are outside a set

limit. All this amounts to big time savings, reduced training costs, and improved data-input integrity. There is no limit to what these macros can do to streamline daily procedures, including making regular backups and assisting managers in extracting the information they need.

With WSM, you also get the ability to perform data integrity tests, assign different printers to different print jobs, exit to DOS, and call a network status report on screen.

#### GENERAL LEDGER

The G/L's budgeting calculator, import/export facility, and Report Writer are all strong. In the budget screen, you can input the budget as monthly dollar values, constant amounts allocated to the periods, percent growth from base values, or incremental dollar amounts. A pop-up window also displays the prior year's actual amounts, the current year's actual amounts, or the current year's budget for

#### ACCPAC PLUS Suitability To Task

	0	1	2	3	4
General Accounting (GAAP)					✓
Financial Accounting					✓
Enterprise Management Reporting					✓
Decision Support					✓

any account. You can take the information from this window and apply it to the account you are currently budgeting. Further simplifying the task of preparing yearly budgets is the ability to adjust the figures in the window using a percent growth or incremental dollar before assigning them to the current account's budget.

Unfortunately, *AccPac Plus* doesn't have the ability to budget into the next fiscal period without overwriting the current year's budget. The program does have the ability to export information to a database file, an ASCII file, or a *Lotus 1-2-3* file.

*AccPac Plus* can interface with other systems that currently exist in an organization; users can import transactions to the G/L as well as to A/R (Accounts Receiv-





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**Don Smith**, a partner (Chicago), serves as national applied systems technology coordinator for the Management Consulting Services group.

**Bill Still** is a former manager (Tampa) specializing in implementing financial information systems.

**Tom White** is a manager (Walnut Creek, California) who directs the Northern California Small Systems Consulting Practice. His group supplies information technology and business advisory services to middle-market, emerging, and closely held companies.

**Greg Winnett** is a manager in the Office of Government Services (Washington, D.C.), where he designs and implements executive financial reporting systems. ■

able) and A/P (Accounts Payable). During the creation of a new department, the import/export feature can be used to export the chart of accounts from one department within a company into another department, making the task of setting up numerous departments less time consuming.

The report writer is extremely powerful in its ability to extract information from the G/L. However, the trade-off is the steep learning curve needed to use it effectively.

For reporting purposes, accounts may be grouped in any fashion. Any individual account can be added to an individual line item. For example, you can list as interest expenses all long-term-debt interest charges from accounts 1100 to 1150, then add overdraft interest from account number 2706. This flexibility is especially important when the chart of accounts lacks a logical structure.

The report generator can carry out an analysis of accounts or account groupings using up to nine columns. Line items in one report can be referenced to amounts in a different report. As a result, you can develop very sophisticated reports that have

simplified financial statements at the top, supplemented by increasingly detailed schedules acting as support.

The Quick Report Writer (QRW) is the company's solution to the report writer's complexity. It allows the user to change the range of accounts pertaining to balance sheet and income statement sections; the result is a standard report specification built from the range of accounts used. This specification can be modified where required. In order to combat text-editing limitations, *AccPac Plus* allows the user to create the file in any word processing package or in the company's own \$195 Easy Filer module and import it into the report document. You can also export an existing report-specification file to a word processing package, make your changes, and then import it back into *AccPac Plus*.

The program saves setup time by copying a report specification file from one company to another. Despite the extensive capabilities the program offers, larger companies may feel somewhat restricted by *AccPac Plus*'s consolidation feature. It is similar to *Lotus 1-2-3*'s Com-

bine/Copy/Add command in that it simply adds two charts of accounts together. The charts of accounts must be exact duplicates of one another or the consolidation will not work. In most cases, it is more practical just to export the chart of accounts to 1-2-3 to do the consolidation. In addition, the limit of one retained-earnings account per company limits the ability of the package to properly account for true investment centers within one entity.

## ACCOUNTS PAYABLE

*AccPac Plus*'s A/P includes all of the expected virtues of a high-end accounting system, such as the all-important cash requirements report and list of outstanding checks. It would be nice to see a developer come up with a cash requirements report that showed cash receipts, cash disbursements, and future periods' budgeted sales and expenses; this would be a truly useful analysis tool for management.

Again, larger companies may find this module to be of somewhat limited usefulness in that it allows only five A/P control accounts and bank accounts.



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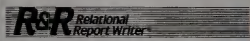
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a savings of \$100! Either way, Peachtree offers you the most accounting you can get for your software dollar.

Peachtree Complete II is a comprehensive accounting system developed to meet the needs of small- to medium-size businesses. It comes with eight high-power modules that may be used individually, or fully integrated for maximum accounting efficiency:

- |                       |                    |             |                |
|-----------------------|--------------------|-------------|----------------|
| • General Ledger      | • Accounts Payable | • Inventory | • Fixed Assets |
| • Accounts Receivable | • Invoicing        | • Job Cost  | • Payroll      |

And Peachtree Complete II is designed using the latest software innovations, like full-color scrolling reference tables, pop-up windows, and short-cut keyed menus. We've expanded to allow an unlimited number of companies, added service invoicing, range printing, and more.

Peachtree Complete II's error handling is quick and easy, with plain English messages and suggestions. Context-sensitive Smart HELP is on-line, all the time. And as always, Complete II comes with the most thorough documentation—a separate quick-start Installation Guide, Accounting Primer, seven-volume Reference Library, and extensive on-line tutorials on each module—all at no extra charge.

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Peachtree Complete II, the Business Accounting System for just \$199, and Peachtree's Double Bonus Bundle for just \$298. Either way you look at it, Peachtree Software saves you money. Order today!

**HARDWARE SPECIFICATIONS:** Requires PC/MS-DOS version 2.0 or higher with 384K of usable memory (512K required with DOS 3.3) and a minimum 10 MB hard disk. For use with the IBM® PC, XT, AT, PS AT, Personal System/2™ and compatibles. 3½" media optionally available. Not copy protected.

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- Up to 14,400 customers
- Prints periodic or service invoices.

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- Checks printed with unlimited invoice listing on stock.

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- Supports average and standard costing methods.
- Up to 19,500 inventory items.

Fixed Assets

- Handles 13,000 assets and 13 methods of depreciation.

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- Tracks costs and profitability on a job-by-job basis.

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\*Telephone number required on all orders.

LAN APPLICATION SOFTWARE  
ACCOUNTING SOFTWARE

AccPac Plus's interface simplifies data entry. The open window shows information for multiple warehouse locations, and from this same screen you can inquire for inventory detail in other locations and for substitute item information.

column for inserting the actual count. When the physical inventory is complete, you simply insert the actual amount counted and reprint the report that lists the item and the difference between the physical count and the amount recorded in inventory.

As with O/E, the real strength of the inventory module is its reporting capability. Reports can be modified, sorted (including a sort by inventory segment), and saved.

The item valuation report lists the values of an item of inventory by individual warehouse or all warehouse locations. It can furnish up to four different valuations, including selling price, standard cost, and actual cost.

The item status report lists the inventory items so that the user can define the information to be printed. You can also define the group of items to be listed based on a variety of sorts.

The overstocked items report defines the overstock conditions from annualized turn-and-earn ratio, quantity greater than maximum level, and quantity greater than projected sales—information necessary for the manager making inventory decisions.

The selling price and margin analysis report allows you to list all items (again sorted according to your particular needs) that have a margin of less than a given percent as compared with average, most recent, standard, or landed cost. You can use this report to see how margins are affected by increasing costs simply by selecting product groups or inventory segments and reviewing the margins as compared with

#### ACCOUNTS RECEIVABLE

As with the A/P module, A/R is fairly generic. However, it does allow grouping customers into territories. A regional manager can use this easily to obtain a report of all customers in his region. In order to extract this information, though, the optional Sales Analysis package (\$495) is required. As with the A/P module, A/R is limited to five control and bank accounts.

The customer statistics report lists information useful to management, such as sales to date compared with prior years' sales, credit limit, outstanding balance, and the average number of days to pay.

#### ORDER ENTRY

By their very nature, O/E modules tend to be detailed. This is due partly to the developers' attempt to accommodate different industry requirements. As a result, users are generally faced with a lot of fields irrelevant to their particular needs.

AccPac Plus deals with this situation in a unique manner by allowing you to customize the O/E template to suit your particular business. During setup, you can define the fields to be visited during initial order entry. The other fields default to the information in the A/R master file and can be edited on a second pass of the screen. However, fields that will never be used can be cut off from user access and bypassed entirely, improving the productivity of the order entry process. In addition, unlimited ship-to addresses can be applied to any one customer.

AccPac Plus produces an order history report that lists the orders from a selected range and shows the amount of the order

and date. This report can be sorted by date, customer, or order number. An order action report allows the user to select orders never invoiced, partially invoiced, or on hold. This report can be further modified to include fields or ranges of fields such as territory, salesman, product, customer, order value, ship date, or warehouse location. You can limit these fields to certain ranges, such as order values in excess of \$10,000—a tremendous advantage from the standpoint of customer service (ensuring that ordered goods are processed on a timely basis) and from a cash management point of view (ensuring that processed orders are invoiced immediately).

Also included are order aging, sales summary, and statistical custom-designable reports. The sales summary report comprises reports on sales, cost of sales, and margin percent. The summary statistics report comprises the number of orders/invoices/credit memos, total sales, the number of price overrides, and the number of days delay in invoicing orders.

#### INVENTORY

The inventory module allows five costing methods: LIFO (last-in, first-out), FIFO (first-in, first-out), running average, item specific, and current cost. You can create up to 20 different control account sets and assign an inventory item to any of these sets. Each control account set is made up of a G/L account for inventory, receipt credit, adjustment write off, and assembly cost credit.

An attractive feature is the module's physical inventory worksheet, which lists the inventory volume by item, along with a

**FACT FILE**

**AccPac Plus, Version 5.0**  
Computer Associates International Inc., 1240 McKay Dr., San Jose, CA 95131; (800) 531-5236  
List Price: \$795 per module (for most modules); LANPac for four users, \$395  
Requires: 512K RAM (EMS optional), 640K disk; Novell's Advanced NetWare 285 2.0 or later, 3Com's 3+ Share, IBM's PC LAN, or most DOS 3.1 standard networks, DOS 3.1 or later (OS-2 optional with minimum 2MB RAM)  
In Short: A very powerful tool for extracting helpful user-defined reports. The Window System Manager and Smart Finder make this product truly unique. Performance times, however, are just average.

CIRCLE 413 ON READER SERVICE CARD



function keys in all modules. You can also customize data entry and some other screens without modifying source code—a neat trick. The package competes with other heavyweight products—particularly *AccPac Plus*, which also features an upgrade path from Computer Associates' lower-end products, but with less user interface commonality.

*Open Systems Accounting Software*, Version 4.0, costs \$4,870, with many other modules available. Once the market leader, *Open Systems* is also coming back from years of development inactivity.

VAR-modified *Open Systems* installations account for around 80 percent of total sales. Written in the new Business Basic Extended Progression/3, *Open Systems* 4.0 addresses every functional area, promising an improved user interface, faster processing speed, and more efficient data entry and master file maintenance.

Users who have despaired over the old *Open Systems*' obsolescence should check out OSAS 4.0.

*Open Systems' Harmony*, Version 2.05, costs \$3,752—down \$940 from its pricing when we reviewed it in August 1988—but appears otherwise unchanged.

*Harmony* bears no relation to *Open Systems*. Written in C, *Harmony* has locked source code. It targets users who want to use the package as is and who especially value a friendly interface.

*SourceMate's AccountMate 2.0 Plus IV* costs only \$2,280 in your choice of compiled or source code. In the latter case, the needed compiler and source documentation would take the price over \$3,000.

*AccountMate's* predecessor got our top rating among dBASE-based accounting programs in our 1987 review. It still enjoys that distinction, though we haven't reviewed the latest version.

The product competes most directly with *SBT*, reviewed in this issue. *AccountMate* uses a 14-character account code versus *SBT's* eight. And *AccountMate* features more-flexible user access control, the ability to print reports to screen, modular source code, and the ability to access all features in *Fox-*

*BASE*, *Clipper*, and *dBASE IV*.

Microx's *Reveille* costs \$3,975, with other modules available. Its modules integrate features for which others charge extra. For example, G/L includes a report writer and network/system manager.

Written in the *Revelation* database language, which permits sophisticated LAN features such as task locking, *Reveille* includes application generators—an exciting alternative to laboring over source code.

*Systems Plus's Accounting Plus*, Version 8.0, costs \$3,000. You can buy the C source code and documentation for the proprietary database used. For rapid data access and file locking, *Accounting Plus* uses Faircom's *CTree*—related to *BTree*.

*Accounting Plus* is sold mainly by VARs as part of turnkey systems for wholesale, retail, service, and medical enterprises. Like *Great Plains* and *Harmony*, the package focuses on ease of use for bookkeepers who don't know accounting well, but it includes sophisticated features such as allowing up to 100 passwords, each tied to need-to-know access control.

For more information, contact:

- Armor Systems, 324 N. Orlando Ave., Maitland, FL 32751; (408) 629-0753
- Cougar Mountain Software, 2609 Kootenai, Boise, ID 83705; (208) 344-2540
- CYMA, a division of World-Wide Technologies, 1400 E. Southern Ave., Tempe, AZ 85282; (800) 292-2962
- Microx, 9444 Old Katy Rd., #103, Houston, TX 77055; (800) 622-4990, (713) 461-6383
- Open Systems, a Unisys Co., 6477 West Parkway, Eden Prairie, MN 55344; (612) 829-0011
- Parker Systems, 10855 Sorrento Valley Rd., #201, San Diego, CA 92121; (619) 452-0395
- SourceMate Information Systems, 20 Sunnyside Ave., Mill Valley, CA 94941; (800) 877-8896, (415) 381-1011
- Systems Plus, 500 Clyde Ave., Mountain View, CA 94043; (415) 969-7047

the most recent cost. The markup analysis report works in a similar fashion.

Although *AccPac Plus's* control and bank account restrictions may limit its usefulness in larger corporations, and although its performance on a network isn't as good as that of some of its competition, its ability to produce customized management-exception reports shouldn't be overlooked. No longer must managers face reports cluttered with information not relevant to their needs; instead, they can search out the relevant items and focus their attention on the issues that are pertinent to their needs. If that's important, then this program is worth considering.

## Data Pro Accounting Series

by Timothy Lee, Steve Owens, Don Smith, and Bill Still

*Data Pro Accounting Series*, from Data Pro Systems, is a powerful, user-friendly package. It not only makes use of the PC's color and graphics capabilities, but it also supplies an easy-to-understand and consistent menu structure across all of its modules. A "concurrent" processing feature allows you to use one module while another is calculating and printing a report. Better yet, you can even be outputting two reports to two different printers at the same time! The program is also nicely priced: Inventory, G/L, A/P, A/R, and Payroll import modules are available for \$750 each.

The user interface incorporates windowed data-entry screens with full-screen editing capability and quickly lets you add vendors or customers on the fly when keying in invoices or orders.

Each user may tailor the menu prompts and screen messages to obtain a novice or advanced mode. You can create a personal configuration file to define printers, screen colors, prompts, and other housekeeping items. The on-line calendar, which offers scheduling for intervals as short as 1 minute, and an address book furnish a consistent environment that facilitates system administration.

Pop-up windows of valid values with partial key-search and on-line context-sensitive help are available in all modules. The macro-recording facility and the capability to execute DOS commands from within the program are a great help. A built-in analytical graph function means

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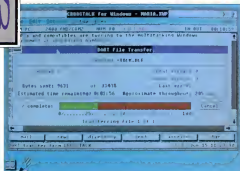
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## ADDING UP ACCOUNTING'S REAL COST

Implementing an automated accounting system—especially one that's destined for a LAN—is full of hidden costs.

by Ray August and Timothy Lee

People often underestimate the real cost of implementing an integrated accounting system. Given the complexity of such a project, that's no surprise. Whether you're considering a single-user or a LAN-based system, the cost you're most likely to forget is for labor and training.

The LAN environment brings with it a need for someone to assume the role of system administrator. He or she will set security rights, coordinate the use of resources, take care of software and hardware upgrades, and keep track of hardware maintenance. The job also includes house-keeping chores such as keeping supplies in

stock and changing forms on a printer.

Your time and that of all the people who work with the system constitute its greatest cost. Trying to record the exact time spent isn't reasonable, but keeping even a short log will give you a feeling for the scope of your investment. A log or worksheet, like the kind shown here, will also help you keep track of the time it took to get your system up and running. Make a few phone calls and get some estimates before you start. You'll soon see why implementing an accounting system requires both cash and confidence.

Looking at the total costs in this way also helps you measure the benefits you

receive. Many of these benefits stem from increased productivity in such areas as preparing invoices, checks, statements, and reports. You'll also see returns on your investment from better cash management, reduced inventory costs, reduced opportunity cost of lost orders, and improved revenues from more active marketing. When you weigh benefits against costs to get the bottom line, you'll find that the benefits from a well-implemented system increase as time passes. An integrated accounting system should do more than just pay for itself—it should yield a strong return on your investment.

LABOR AND TRAINING COSTS	INTERNAL STAFF		OUTSIDE STAFF		EXPLICIT FEE	Total
	Hours	Rate	Hours	Rate		
<b>SELECTION</b>		\$		\$	\$	\$
Define system strategy						
Define selection process						
Evaluate systems						
Select systems						
<b>NETWORK INSTALLATION</b>						
Prepare site						
Administrate system						
Design security						
Install network						
Train staff						
<b>ACCOUNTING IMPLEMENTATION</b>						
Train staff						
Develop procedures						
Convert data						
Do parallel processing						
<b>ONGOING ACTIVITIES</b>						
Upgrade implementation						
Develop custom reporting						
Grand total					\$	\$

that each module can display graphs for financial management. A standard capability to export financial reports as delimited ASCII files gives you an easy and effective means of performing ad hoc analyses in your favorite spreadsheet or database.

An on-line checklist for each module assists in organizing the necessary installa-

tion tasks. Master file maintenance for customers, vendors, accounts, and inventory items is aided by the ability to copy defaults from one master record to another. By using "dummy" records as a template for a specific set of defaults, you can ease both initial data setup and entry of new vendors.

Network installation is straightforward and cost effective. The standard LAN version allows up to 35 users. Besides ensuring compatibility with Novell's *NetWare*, the IBM Token-Ring Network, 3Com's *3+Share*, and IBM's *PC LAN*, *Data Pro* offers Unix and Xenix versions of the product.

# LAN APPLICATION SOFTWARE ACCOUNTING SOFTWARE

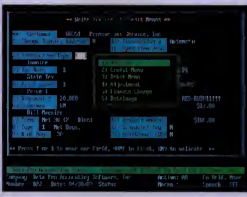
## GENERAL LEDGER

The G/L allows an account number to be up to ten characters long. You can format your accounts to use a subaccount grouping which allows masking of reports. You can also specify the pattern example that *Data Pro* displays for the field. Predefined charts of accounts, using a standard four-digit format for the prime account, are available.

Establishing the chart of accounts is made simpler by the ability to copy an existing G/L account to another. When you are inputting journal entries, a simple but helpful field indicates whether a debit or credit amount increases or decreases an account balance. You decide whether transactions will be done on-line or in batch mode. A batch edit list is printed before posting the entries to actual accounts.

Data entry time is decreased by automatic calculation of debits and credits, as well as by automatic balancing of journal entries. *Data Pro* can maintain a transaction register in date order, this is useful in supplementing the trial balance and G/L audit trail reports for investigating changes to accounts.

Multicompany accounting is very easy. Pressing one function key switches between companies so that multiple-company ledgers may be accessed from a single journal entry screen. You can enter a transaction made for a lease payment by company A; it will calculate the intercompany account debit and generate a transaction in company B's books. It's smart, sophisticated, and labor saving when multiple companies are involved.



*Data Pro Accounting Series's* use of pop-up windows reduces data entry time and increases accuracy. In each data entry field, you can accept the default values filled in from the customer master, type an override, or view and select a valid entry from the window.

G/L contains the standard income statement, balance sheet, trial balance, statement of changes in financial position, comparative statements, and ratio analysis reports. While posting from other modules can be done in detail or summary, the limitation of only 32,000 records in a single file precluded *Data Pro* from completing the PC LAN Labs year-to-date Trial Balance test, which had over 45,000 records. However, the time needed for reporting a smaller set of 27,000 detail items for the accounts was consistent with the excellent times the package had for other benchmark report tests.

Defining custom reports in G/L Report Writer follows a line-by-line definition process. You specify a code indicating the purpose of each line and the data to appear on that line.

## ACCOUNTS PAYABLE

A/P has the capability to manage even the most complex banking arrangements with sophisticated bank management processing. Maintaining multiple checking accounts to segregate funds, exercising greater control over multiple locations, or managing float times for payments received across the country is easy.

You can simultaneously process up to five checking accounts with separate and different preprinted check forms and check registers for each account. A separate check reconciliation module (\$395) runs standalone or integrated with A/P, Payroll, or even G/L. Its rapid-entry mode speeds the data entry time for this process. Accrual basis accounting—where distributions to expense and liability accounts are re-

corded to the G/L upon entry of the invoice—is the system default. But if you need the cash basis option, *Data Pro* will not record the invoices you enter into the system until they are paid.

Invoices can be vouchered to the A/P or the Purchase Order module after receipt of goods. Line-item control in vouchering includes the ability to add freight to a Cost of

## DATA PRO ACCOUNTING SERIES Suitability To Task

	0	1	2	3	4
General Accounting (GAAP)				✓	
Financial Accounting			✓		
Enterprise Management Reporting				✓	
Decision Support					✓

Goods account and to receive inventory.

Check voiding is well implemented. If you often receive COD deliveries, the ability to generate a single system check or to easily record manual checks is convenient. Three features to assist your cash management include a cash-flow analysis report that ages both past-due and future-period payments, a vendor-aging report that ages invoice detail in either 7- or 30-day groups, and the choice of always taking a payment discount.

## PC FACT FILE



**Data Pro Accounting Series, Version 1.2**  
Data Pro Accounting Software Inc., 5439  
Bessumont Center Blvd.,  
#1050, Tampa, FL  
33634; (800) 237-6377,  
(800) 282-4101 (FL  
only), (813) 885-9459.  
List Price: \$750 per module (for most modules);  
System Administrator, \$100 for 38 users.  
Requires: 540K RAM, Novell's Advanced  
NetWare 286 2.0 or later, 3Com's 3+ Share,  
AT&T's StarLAN, Banyan's VINES, IBM's PC  
LAN; DOS 3.1 or later.  
In Short: An innovative product that will surprise  
you with its advanced features. The only glaring  
weakness: its inability to maintain more than  
30,000 transactions, which could be a handicap  
in larger settings.

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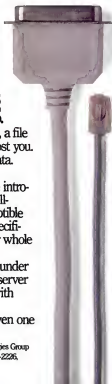


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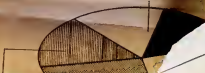
# Spreadsheet Rivalry Heats Up

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**'Things are getting down and dirty,' a computer analyst observes.**

## The Spreadsheet Market

OTHER 6.1%



**RACE OF  
VS. PO**

# We Interrupt T War For This Im

To all those unlucky enough to be stuck smack in the middle of the current spreadsheet confusion, take heart.

There is, at last, a viable alternative to war: revolution.

One that delivers even more performance than you have (ahem) been waiting for, but without demanding expensive new hardware or extensive retraining. And without abruptly cutting you off from any user in your company, even those on mainframes.

The name of the spreadsheet is SuperCalc®5.

And what it can do for you is, frankly, quite revolutionary.

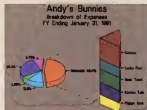
Let's begin at the end. Stand-alone quality graphic capabilities have been built in.

Offering hundreds of presentation treatments from word charts to three-dimensional bar, pie, scatter, and polar graphs.

And with SuperCalc5, you select fonts, lines, boxes, grids and shading. All of which can be used to produce the highest quality customized reports.

Plus, SuperCalc5 actually makes productivity easier. An integrated Undo feature simply reverses unwanted commands. And a truly comprehensive system of debugging highlights costly errors and analyzes macro logic.

Perhaps even more impressive



Present a state-of-the-art picture of your work.

Link just about everything in sight.

is the way SuperCalc5 can link spreadsheets. Up to 255



Catch bugs before they come back to bite you.

# POWER ATION

the field had been ranked and the odds of a personal computer spreadsheet software. a

Spreadsheet Ready to Pounce.

Analysts said that in-

January 28, 1989

**New program  
...es to fend off  
...eadsheet war**

at Gain  
on Riv  
a spreadsheet

• A restructuring MIF plan. The plan is a financing component of a restructuring plan. Micro-

creating a  
station at

# The Spreadsheet portant Update.

to be precise. Linking either in memory or on disk, either pages of the same spreadsheet or independent, either SuperCalc5's files or Lotus' 1-2-3's.

Which brings us to the "L" word. SuperCalc5 not only reads and writes Lotus® 1-2-3® files, it totally coexists with Lotus.

and compatible computers but also takes full advantage of 286 and 386 machines when you decide to make that transition.

And if all that isn't enough to make you run out today and join the revolution, there's even more incentive.

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Which finally brings us to our admittedly biased outlook for the much touted spreadsheet war. With SuperCalc5, peace is at hand.

[illegible]

*Produce annual-report quality output everyday*

Letting you easily move 1-2-3 macros into SuperCalc5 and back again. Even toggling between menus is a snap for SuperCalc5.

But not for Excel.\*

Which now brings us to the "E" word. Unlike Excel, SuperCalc5 runs on all IBM\*



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**ACCOUNTING SOFTWARE**



## ACCOUNTING SOFTWARE: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macola	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>MODULE PRICES</b>								
General Ledger (G/L)	\$795	\$750	\$795	\$795	\$795	\$795	\$595	\$795
Accounts Receivable (A/R)	\$795	\$750	\$795	\$795	\$795	\$795	\$595	\$795
Accounts Payable (A/P)	\$795	\$750	\$795	\$795	\$795	\$795	\$595	\$795
Order Entry (O/E)	\$795	\$750	\$795	\$895	\$695	\$795	\$595	\$695
Inventory	\$795	\$750	\$795	\$895	\$795	\$795	Unavailable	\$795
Payroll	\$995	\$750	\$795	\$795	\$795	\$795	\$595	\$795
Purchasing	Unavailable	\$750	\$795	\$895	\$795	\$795	\$595	\$695
Job Costing	\$795	\$950	\$995	\$1,595	\$995	\$795	\$595	\$995
Network system manager	\$395	Included with modules	\$995	\$495	\$1,095	Unavailable	Unavailable	\$795
Single-user system manager	Included with modules	\$100	Included with modules	\$95	\$95	Unavailable	Unavailable	\$95
<b>TECHNICAL SUPPORT</b>								
Toll-free number	●	●	●	●	○	○	●	●
Third-party support	●	●	○	●	●	●	●	●
Certified consultant training	●	●	●	●	●	●	●	●
Certified dealer/reseller training	●	●	●	●	●	●	●	●
On-site training	●	●	●	●	●	●	●	●
Printed tutorials	●	●	●	●	●	○	●	●
On-line tutorials	○	○	●	●	○	○	●	●
<b>MULTIUSER SYSTEM FEATURES</b>								
Maximum number of concurrent users	256	38	Unlimited	Unlimited	Unlimited	Unlimited	254	30
Displays list of users currently logged in	●	●	○	○	○	○	○	●
File and record locking:								
Automatic retry of locked records after delay	●	●	○	●	●	○	●	●
File lock allows read-only access	●	●	○	●	○	○	●	○
Locks message lists	●	○	○	○	●	○	○	○
Lists last database conflict	●	○	○	○	○	○	○	○
Record lock allows reading by other users	●	●	●	●	●	○	●	●
Security:								
System password	●	●	●	●	●	●	●	●
Reporting privileges defined by password	●	●	●	●	●	●	●	●
Maximum number of characters per password	6	10	8	10	8	10	10	10
File encryption	●	●	○	●	●	●	○*	●
Audit of successful and unsuccessful access	○	○	○	○	○	○	○	○
<b>SUPPORTED OPERATING SYSTEMS</b>								
IBM's PC LAN	●	●	●	●	●	●	●	○
3Com's 3+Share	●	●	●	●	●	●	●	○
Novell's NetWare	●	●	●	●	●	●	●	●
Banyan's VINES	○	●	○	●	●	○	●	○
Unix/Xenix	○	●	○	○	○	●	●	○
OS/2	●	○	○	○	●	○	○	○

● —Editor's Choice    ● —Yes    ○ —No

\* SBT Database Accounting Library cannot perform this task within the compiled version of the software, but the task can be accomplished within the dBASE environment.



**LAN APPLICATION SOFTWARE**  
**ACCOUNTING SOFTWARE**

	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macola	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>APPLICATION SYSTEM MANAGER</b>								
Quick maintenance for master file items	●	●	○	○	●	○	○	●
Master file inquiry using windows	●	●	●	●	●	○	○	●
User-defined options on each menu	○	●	○	○	●	●	○	○
Custom configuration of user menus	●	●	○	○	○	○	○	○
Modifiable pop-up window	○	○	○	○	●	○	○	○
Full-screen editing	●	●	○	○	●	●	●	●
Macro facility	●	●	●	●	●	○	○	○
Data dictionaries	○	○	●	●	●	●	●	●
Spool to any network printer	●	●	●	●	●	○	○	●
<b>IMPORTS/EXPORTS</b>								
Delimited ASCII files	●/●	●/●	○/○	●/●	●/●	○/●	○/●	●/●
SDF ASCII files	●/●	●/●	●/●	●/●	●/●	○/○	○/●	○/○
.DIF files	●/●	●/●	○/○	○/○	●/●	○/○	○/○	○/○
SYLK files	●/●	●/●	○/○	○/○	○/○	○/○	○/○	○/○
.DBF files	●/●	●/●	○/○	○/○	●/●	○/○	○/○	○/○
<b>MODULE INTEGRATION</b>								
G/L with Inventory	●	●	●	●	●	●	●	●
G/L with Fixed Assets	●	○	○	●	○	○	●	●
A/P with Job Costing	●	●	●	●	●	●	●	●
A/P with Purchasing	●	●	●	●	●	●	○	○
A/R with Job Costing	●	●	○	○	●	●	○	○
A/R with Order Entry	●	●	●	●	●	●	●	●
Purchasing with Fixed Assets	○	○	○	○	○	○	○	○
Purchasing with Inventory	●	●	●	●	●	●	●	●
Purchasing with Job Costing	○	●	○	●	●	●	●	○
O/E with Purchasing	○	●	○	○	○	○	○	○
O/E with Inventory	●	●	●	●	●	●	●	●
<b>PROGRAM MODIFICATION</b>								
Source code available	● (cost varies) ○	○	○	● (\$795)	○	● (\$1,295)	● (free)	● (cost varies)
Manufacturer makes code modifications	○	●	○	●	○	○	○	○
Manufacturer makes form, report, and screen modifications	○	●	○	○	○	○	○	●
Developer's guide available	●	○	●	●	●	●	●	●
<b>GRAPH GENERATION</b>								
Financial statements	●	●	●	●	○	○	○	●
Aging reports	○	○	○	●	○	○	○	●
Chart of upcoming cash requirements	○	○	●	○	○	○	○	●
Cash flow statements	○	○	●	○	○	○	○	●
Cash flow worksheets	○	○	●	●	○	○	○	●
Actual-to-budget comparison for any month	●	●	●	●	●	●	●	●
Present-to-prior-year comparison for any month	●	●	●	○	○	○	○	●
Ad hoc inquiry drawn from several modules simultaneously	●	●	●	●	●	●	○*	●

CONTINUES

**ACCOUNTS RECEIVABLE**

A/R offers good management analysis and many transaction features without the need for the Sales O/E module. Basic processing includes balance-forward or open-item account maintenance, invoices, debit and credit memos, adjustments, finance charges, and payments. In addition, you get support of retentions, deposits, invoice cycles, and the generation of proposals (quotes). You need the Sales O/E module to convert a proposal into an invoice, though.

You can use the invoicing cycle code for customers to reflect your collection priorities and to group work more effectively. Salespersons' commissions may be paid on collection of either total sales price, gross profit per sale, or just the gross billing amount. Aging reports can be grouped by customer or salesperson and within sales regions.

**ORDER ENTRY**

Sales O/E supports businesses with regular inventory needs, retail sales operations, and professional service organizations. If you've been frustrated by accounting packages that can only discount or tax a total invoice, you will appreciate *Data Pro's* line-item control for price, freight, tax, discount, and cost of goods and sales account codes.

Pressing F10 at the unit price field lets you select a discount from your discount structure or enter in a discount percentage for that line item. Tax calculations will be correct, and you'll be able to easily implement an item-based discount structure.

Auto-cancel orders are canceled by the system if they are not shipped by the promised ship date. Special orders and drop shipments effect tight integration for just-in-time systems when you have the Purchase Order module; they allow you to create single or multiple purchase orders with the company's or a customer's address as the ship-to address on the purchase order—without rekeying the information. The proposal order is helpful for supplying clients with a quote: it accesses the inventory file for quantities and pricing but does not generate a live order or allocate inventory. Once the proposal has been accepted by the client, you can activate it by changing it to a normal order. Deposits received on any order can be immediately credited to the customer.

User-defined price breaks, salesperson numbers for commission calculation, and tax rates are standard. *Data Pro* links to the

Job Costing module (if it is in use) by prompting for a job number related to each sale. Only three types of payment terms are supported: net days, fixed due date, or net days/end-of-month (EOM). While the net days/EOM terms code is important in some industries, support for terms including discount days such as "2/10 net 30" (2 percent discount when paid in 10 days or net due in 30 days) would have broad applicability.

Packing lists are printed in bin number order; a good bin number coding scheme will help your warehouse operations. The

**Data Pro's  
Payroll module is  
distinguished by fields  
that track employee  
skills and career  
progress.**

bill of lading can be detailed or in summary, and multiple shipping labels can be printed. Surprisingly, *Data Pro* does not easily support multiple ship-to addresses.

To support the actual shipment of sales orders, the sales O/E system prints packing lists (pick tickets), shipping labels, and bills of lading. As with most *Data Pro* reports, you can select from several formats for these reports.

**INVENTORY**

Inventory can stand alone or be integrated with the A/R, Sales O/E, or Purchasing modules. It supports direct entry of purchase orders, receipts, sales orders, sales withdrawals, inventory returns, and transfers among multiple locations. *Data Pro* supports the full range of costing methods—average, last cost, standard, and up to 20 layers in LIFO or FIFO—which can be changed within the current accounting year. Bin numbering is aided by the inclusion of bar code printing support. When matched with light pens or other devices, the bar coding can improve accuracy and decrease data-entry labor costs. Inventory is distinguished by a 20-character item

number defined by four segments; this is an excellent setup to have when a code has different components like model, version, and color.

An item description can consist of up to four lines of 30 characters each, which is great for professional service firms. Description lines that begin with an asterisk are never printed on external documents like sales orders or bills of lading and so are useful for internal comments addressed to clerks or salespeople. Four pop-up windows access reorder information, pricing tables, cost information, and historical information. The reorder information consists of primary vendor number and vendor item number, secondary vendor information, minimum and maximum stocking levels, and minimum order quantities.

Physical counts are made easier by a data-entry option that displays the inventory item in countsheet order. After entry, the G/L entry for shrinkage and a shrinkage report are generated automatically. For control purposes, you will need to furnish a cost basis for increases in inventory in a manual adjustment entry.

Serial-number tracking is awkward since each unit is an individual item record in inventory. Advanced accounting design usually involves maintaining a file with individual units sharing one inventory item number. Better systems allow you to retrieve the items in LIFO or FIFO fashion, determine the serial number from purchase order receipts, and support some level of warranty tracking.

**PAYROLL**

Payroll is distinguished by additional fields that track employee skills and career progress, as well as maintain an unlimited number of dated comments. This can be useful in recording details for use in evaluations and reviews. The Job Costing and Time Billing modules include specialized payables, receivables, payroll, purchase order, inventory management, time sheet entry, and an estimation interface to import budgets and cost transactions from other devices such as time clocks or bar code readers.

*Data Pro* offers multilevel password protection at each screen. However, it's cumbersome for a supervisor to have to memorize a list of passwords. Comparable systems have user profiles and possibly an additional feature password. The profile record is maintained by the system administrator and defines security for all menu options.

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## LANGUAGES

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<b>Parade Systems</b>	
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## INPUT DEVICES

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## SHIPPING

- Orders for in-stock items placed by 6:00 p.m. (E) weekdays, ship overnight by Airborne Express, unless UPS ground delivery overnight (Some rural areas require an extra day)
- Shipping charge \$7 per order up to 7 lbs. \$1 per lb. above
- UPS ground service also available upon request - \$3 per order. UPS orders placed by 3:00 p.m. (E) weekdays, ship same day
- Actual freight charges apply for computers, hard disks, 8mm disk, tape back up, monitors and printers
- Alaska, Hawaii, outside continental U.S. APO/FPO call for information

\*Defective software replaced immediately. Hardware replaced or repaired at our discretion. Item availability and price subject to change without notice.

Software is not copy protected, except where marked by asterisk.

**CONTEST RULES:** 1. Entry must be received on or before 1/31/90. 2. Winner selected in random drawing by attorneys for Micro Warehouse Inc. (MWH), whose decisions are final. 3. Prize subject to availability. MWH reserves the right to substitute wholesale cash value up to \$5,000. 4. Winner responsible for taxes. 5. Odds of winning depend on number of entries. 6. MWH will announce the winner on or around 2/28/90. 7. Winner will be notified by mail. 8. Dates subject to change at the discretion of MWH. 9. Winner to contact winner, or alternate will be selected by random drawing. 10. Contest is open to US residents, except where prohibited by law. Employees of MWH and suppliers not eligible. 11. Prize Computer 5.0 1.2Mb w/40K RAM and 40Mb Hard Disk.

## MODEMS & FAX BOARDS

<b>Everax</b>	
Modem 2400 Baud Int	143
<b>Practical Peripherals</b>	
Modem 12000 bnd	65
w/ProComm	174
Modem 2400S Ext	174
<b>Quadram</b>	
JT Fax Board 4800bnd Int	215
<b>The Complete PC</b>	
The Complete Fax 9600bnd Int	435

## MONITORS

<b>NEC</b>	
Monitor Multisync 2A	495
Monitor Multisync 3D	859
Monitor Multisync GS	219
<b>Princeton Graphics</b>	
Ultra-14 VGA	539
<b>Zanith</b>	
ZCM 1490 14" Flat Screen	579

## PRINTERS

<b>Canon</b>	
LBP-8III Laser	1645
<b>Pacific Data Products</b>	
25 Cartridges in One	283
Plotter in a Cartridge	255
<b>Pensonic</b>	
KX-P1124 Dot Matrix	345
KX-P1191 Dot Matrix	228





# ACCOUNTING SOFTWARE: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macrole	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>GENERAL LEDGER</b>								
Maximum number of accounts	65,535	10,000	Unlimited	Unlimited	Unlimited	Unlimited	99,999	Unlimited
Maximum number of companies	Unlimited	48,000	Unlimited	99	Unlimited	1,296	99	Unlimited
Maximum number of departments, subaccounts, and divisions	65,535	Unlimited	999	99,999	Unlimited	99,999,999	999	Unlimited
Maximum number of open months	24	13	17	13	Unlimited	13	26	13
Maximum number of fiscal periods	13	13	13	13	13	13	13	13
Dollar limit on transactions	\$1 billion	\$1 trillion	\$1 billion	\$1 billion	\$100 trillion	\$1 trillion	Unlimited	\$100 million
<b>G/L FUNCTIONS</b>								
Processing suspended for unbalanced amount	○	●	●	●	○	●	●	●
Automatic reversing entries	●	○	●	●	●	●	●	●
Automatic recurring entries	●	●	●	●	●	●	●	●
Consolidations of different companies	●	●	●	●	●	●	●	●
Entrance of next year's budget this year	○	●	○	○	●	○	●	●
Percentage calculations (various)	●	○	○	○	●	●	●	●
Percentage calculations (constant)	●	○	○	○	●	○	●	●
Standard monthly allocations performed	●	●	○	●	●	●	●	●
Imposition of transaction dollar limits	●	○	○	○	○	○	○	○
Processing of 2 years simultaneously	●	●	○	○	●	●	●	●
User-definable account structure	○	●	○	○	●	○	○	○
Built-in on-line graphing	○	●	○	○	○	○	○	○
Other modules post detail to G/L automatically	●	●	●	●	●	●	●	●
<b>G/L REPORTS</b>								
Changes in financial position statement	●	●	●	●	●	●	○*	●
Components of working capital report	●	●	○	●	●	●	○*	●
Cash flow statement	○	○	●	●	●	●	○*	●
Cash flow report	○	●	●	●	●	●	●	●
Cash flow calendar listing projected cash by date	○	○	●	○	○	○	○	○
User-defined balance sheet	●	●	●	●	●	●	○*	●
User-defined income statement	●	●	●	●	●	●	○*	●
User-defined statement of changes	●	○	○	●	●	●	○*	●
User-defined column size	●	○	○	○	○	○	○*	●
User-created descriptive captions	●	○	●	○	●	●	○*	●

PC — Editor's Choice ● — Yes ○ — No

\* SBT Database Accounting Library cannot perform this task within the compiled version of the software, but the task can be accomplished within the dBASE environment.

CONTINUES

## VIEWED AS A WHOLE

Documentation is complete and easy to follow. Each module contains a section that introduces standard *Data Pro* functions like menu formats, editing keys, automatic back-up-and-restore procedures, and the desktop accessories (calculator, address book, and calendar). The specific module documentation also con-

tains configuration information.

*Data Pro's* pricing and completeness of standard features in its core financial modules ensure excellent value in a modern, powerful, and easy-to-use multiuser accounting system. The ease and naturalness of management analysis in the reports and graphs flow smoothly. Both the novice and the experienced user will benefit from

the program's consistent menus and data-entry screens; the ability to tailor prompts, messages, macros, and DOS commands; and concurrent processing. In addition, *Data Pro* impressed us with its speed in managing multiple tasks from a single workstation, as well as with its impressive performance in reporting and transaction processing.

## Great Plains Accounting Series

by Raymond August  
and Barbara J. Mullins

The *Great Plains Accounting Series*, from Great Plains Software, is not only as swift and slick as a Jaguar but also shows all of the workmanship and sophistication of that automobile.

*Great Plains*' performance in our current report-printing benchmark tests, a true test of multiple processing, demonstrated the product's multiuser sophistication. *Great Plains* (\$795 per module for most modules) had the lowest level of degradation—under 5 percent—when going from printing one report on a single station to printing the same report with four other workstations simultaneously printing.

The Network Manager adds multiuser capabilities and handles program-, file-, and record-level lockouts while listing all current users in each application. The cash-drawer, keyboard, and video setup information can be configured for each individual workstation to meet the operator's requirements.

Data entry is smooth and effortless, with look-up windows in each module simplifying the task. Most master file records can be reviewed in a pop-up window for specific item selection and can be transferred to the entry screen with all the relevant information. The A/P (Accounts Payable) and O/E (Order Entry) modules allow the user to set up vendors and customers on the fly during vendor invoice and customer sales O/E.

A comprehensive password security system protects sensitive accounting information. Passwords can be specified to access the system setup, posting, and utility functions. Other access passwords can be assigned to grant access rights by individual, module, or menu function.

With the exception of Inventory (which uses on-line transaction entry), all modules use the batch method of transaction entry. The batch number and the description are user defined. This description is carried through the entire posting process so that the source of each transaction can be quickly identified. *Great Plains* allows selective posting of these batches, thus granting the user greater timing flexibility for specific transactions. The system lists the total number of transactions in each

batch so that the accounting manager can ensure that all necessary transactions have been entered.

### GENERAL LEDGER

G/L (General Ledger) takes care of the basics and more. Account numbers consist of a four-digit code number or a combination of the code and any or all of the following: location code, department code, and sub-account code. You can keep period-by-period budgets for each account and update them automatically at the end of each year. The program also retains last year's figures and makes them available for use on all of your reports.

Sixteen formats for a sample chart of accounts and a corresponding financial statement are included. They can be used as is or modified to suit your needs. For a minimum fee of \$500, *Great Plains* Software will design customized charts to meet your company's requirements. If you prefer, the company will review your existing chart for \$50 per hour.

G/L maintains records for up to 13 periods in a fiscal year. It retains transaction details for the entire fiscal year unless the user chooses to consolidate these records into a summary. G/L allows the user to record transactions for up to four future periods per fiscal year without closing the previous fiscal year. This is useful at year end, when you want to keep your books open for the auditors but need to move on to enter information for the current year just underway.

G/L allows automatic recurrence and reversal of journal entries. A recurring batch is specified at the time of entry,

while a reversing batch must be designated at posting time. But relying on the individual responsible for posting to perform the reversal is an awkward approach.

Users of past versions of the software will be glad to see that the chart of accounts no longer requires the inclusion of report-formatting accounts. When designing financial statements, simply go to a financial-formatting screen and assemble the desired statement layout.

### GREAT PLAINS ACCOUNTING SERIES

#### Suitability To Task

	0	1	2	3	4
General Accounting (GAAP)				✓	
Financial Accounting			✓		
Enterprise Management Reporting				✓	
Decision Support				✓	

All of the standard G/L reports are available, as well as a cash flow calendar and a statement of cash flows. The cash flow calendar integrates with both the A/P and A/R (Accounts Receivable) modules. In a monthly calendar format, it consolidates the projected cash flow on a daily basis using information obtained from A/P vouchers and A/R cash receipts. Audit trails maintain a complete record of each transaction with excellent cross referencing.



*Great Plains Accounting Series's* Order Entry module has a clean interface combined with sophisticated features. The lower half of the screen allows you to specify line item detail. It's made easier by pop-up lookup tables with valid choices for each field.



**LAN APPLICATION SOFTWARE**  
**ACCOUNTING SOFTWARE**



## ACCOUNTING SOFTWARE: SUMMARY OF FEATURES

(Products listed in alphabetical order)

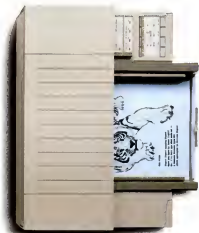
	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macota	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>ACCOUNTS PAYABLE</b>								
Maximum number of invoices per payment	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Maximum number of account distribution fields	Unlimited	10	104	99	4	Unlimited	Unlimited	Unlimited
Maximum number of bank accounts supported	5	5	1	Unlimited	Unlimited	1	Unlimited	Unlimited
Maximum number of vendor addresses	1	2	2	1	1	1	1	1
Maintains and recalls data fields on a formatted screen for:								
Vendor "pay-to" address	●	●	●	●	●	●	●	●
Alternate "order-from" address	○	●	●	●	○	○	○	○
Purchases made this year to date	●	●	●	●	●	●	●	●
Purchases made last year to date	●	●	○	●	○	●	●	○
Total purchases last year	●	●	●	●	○	●	●	○
Date and amount of last purchase	●	●	○	●	●	●	●	○
Last check number, amount, and date	●	○	●	●	●	○	●	Date only
<b>A/P FUNCTIONS</b>								
Detects duplicate invoice numbers for the same vendor	●	●	●	●	●	●	●	●
Checks duplicate voucher number for same-vendor voucher	●	●	●	●	●	●	●	●
Performs quick add of vendors	●	●	○	●	●	●	●	●
Writes one check per voucher	○	●	●	○	○	○	○	○
Customizes checks	●	●	●	○	○	○	○	○
Limits on-line lookup of accounts to A/P accounts only	○	○	○	●	○	○	●	○
Records 1099 information on-disk for electronic filing	○	○	○	●	●	●	●	●
Has date-triggered recurring batches	○	○	○	●	●	●	●	●
Has user-triggered recurring batches	●	●	●	●	●	●	●	●
Tracks recurring batch by amount paid	●	○	○	●	○	○	○	●
Automatically purges inactive vendors	○	●	○	●	○	○	●	●
Reinstates voided invoices	○	●	○	○	●	●	○	○
Reconciles checks against bank statement	●	●	○	●	●	●	●	●
Lists outstanding checks	●	●	○	●	●	●	●	●
Captures any statistical data (such as units purchased)	○	●	○	●	●	○	●	●
Maximum number of G/L distribution accounts	Unlimited	10	2	10	2	Unlimited	1	Unlimited
<b>A/P REPORTS</b>								
Check reconciliation	●	●	●	●	●	●	●	●
Purchase analysis by region	○	○	●	●	●	○	○	○
Cash projection by due dates	●	●	●	●	●	●	●	●
Cash projection by discount dates	●	●	●	●	●	●	●	●
Cash discounts lost	●	○	●	●	●	○	○	○
Year-to-date vendor detail report	●	●	●	●	●	●	●	○

PC —Editor's Choice ● —Yes ○ —No

\* SBT Database Accounting Library cannot perform this task within the compiled version of the software, but the task can be accomplished within the dBASE environment.

CONTINUES

We keep telling people  
this is not a laser printer.



The new \$995 HP DeskJet PLUS Printer.

# But they keep looking at the evidence.



Mr. Arnold R. Jones  
220 Bush Street, Suite 402  
San Francisco, CA 94104

**Dear Reader:**

Imagine being able to get your merged text and graphics that look as if they were printed on the same piece of paper. You can now, by using the \$995 HP DeskJet PLUS printer (shown).



This is what a sales manager wants you to see. And now you can see it with the HP DeskJet PLUS printer. Software for this year and graphics demonstration by the word computer.

Sincerely,

*Alan Grube*  
Alan Grube



## MegaCorp 1988 Sales History



You won't believe your eyes (or ears), either. The HP DeskJet PLUS printer gives you the same crisp, black lettering. Clean, sharp graphics. And whisper-quiet operation. But it uses advanced inkjet technology to supply these laser-like qualities for the price of a 24-wire printer.

For just \$995, you get 300 dpi in a trim 15-pound package that's twice as fast as the original. What's more, it has built-in landscape and improved font selection. Including ten built-in fonts and over 100 optional fonts, with sizes up to 30 points. And its 20,000-hour MTBF

assures a long, happy life.

So call 1-800-752-0900, Ext. 276J for the name of your nearest authorized HP dealer. Then judge the HP DeskJet PLUS printer for yourself.



**HEWLETT  
PACKARD**

**ACCOUNTS RECEIVABLE**

The *Great Plains A/R* module deserves praise for its administration of credit management and its unique and useful features.

The scheduled payment option allows the recording of all future payments. Simply specify the number, amount, and frequency of multiple payments; based upon the payment-due date, the system will automatically calculate the amount due. This feature is helpful for businesses that receive a constant stream of payments from customers.

User-defined aging periods, combined with the option of aging balances from either the due date or the invoice date, ensure flexibility in account aging. Discounts are automatically calculated and are reflected on aging reports, screen inquiries, and customer statements.

Commissions are calculated at a user-defined rate and can apply to either sales amounts or collected amounts. If interfaced with Payroll, A/R will verify the salesperson's employee code and will transfer commissions earned to the Payroll module for payment and tracking. Commissions can be paid upon invoicing of a sale or upon receiving the proceeds from the sale.

Finance charges can be calculated on the invoice amount or on the invoice amount plus any previously assessed finance charge. A minimum balance to charge or a minimum finance charge amount can be specified by the user, or finance charges can be waived. To eliminate the allocation of the costs through G/L, finance charges may be posted to a specific department and location.

Customer statements can be printed for a user-defined range of customers or for delinquent customers only. Custom messages can be specified for all statements, overdue customer statements, or individual statements. Unfortunately, A/R does not allow you to print the customer invoices; this must be done through the O/E or Job Costing module.

**ACCOUNTS PAYABLE**

A/P provides for the entry and tracking of checks for full, partial, or prepaid amounts and allows for the distribution of the expense and the recording of the check in the same transaction entry. The multiple inquiry and reporting features of this module include the option for a user-defined layout of computer checks.

Flexible payment terms allow users to

work with a large number of vendors and still automatically calculate discount and due dates accurately. Three different cash reports help you review upcoming cash needs and make the best use of available discounts to improve cash flow.

Multiple cash accounts can be maintained by the A/R and A/P modules, although this is accomplished by using the location number in the G/L chart of accounts. This is a very awkward method that stands out in contrast to the package's other unique and well-implemented features.

A unique and useful accounting control ensures that a check number has not been entered when a customer's payment has been made with cash.

**ORDER ENTRY**

O/E brings together two powerful functions. In a retail setting, its point-of-sale function can allow for speedy over-the-counter sales entries. This function can be teamed with an electronic cash drawer and a bar code reader to turn your computer into a cash register. O/E also can handle complex sales in a warehouse or mail-order environment: it generates quotes, back orders, and picking tickets and handles markdowns, serial numbers, discounts, and taxes simply, swiftly, and accurately.

As with all of the other modules, O/E allows the user to custom-design all forms, including invoices, picking tickets, and

quotes, to meet business needs or preferences. Invoices and picking tickets can be printed either singly at the time of entry or in batches at any time thereafter. Shipping labels and UPS COD labels can also be printed.

Orders for noninventoried items can be entered and invoiced through the O/E module, thus expanding its usefulness for service organizations. As many as 50 separate taxes can be calculated and assessed per invoice, with up to 239 taxes per item, resulting in an almost unlimited variety of tax configurations.

Credit checks are performed as each line item is added to an order; the user is warned as soon as the total exceeds the customer's credit limit. The user then has the option of overriding the warning or putting the order on "hold" or "credit hold" and invoicing later. The program also accommodates credit card purchases and tracks these charges by type to as many as four different cards at one time.

If the quantity ordered exceeds the amount available, the system prompts with a pop-up window that offers the choice of cancelling the entire order, shipping the available items and back-ordering the balance, back-ordering the entire amount, or manually overriding the quantity.


O/E can generate reports analyzing your sales activity for efficient sales management. Open order, back order, and quote reports help you keep on top of current activity.

**INVENTORY**

Inventory is flexible enough to meet the specific needs of almost any business; it relies on six different inventory valuation methods: LIFO and FIFO may be used on either a periodic or perpetually updated basis, while perpetual moving average and standard cost are also available.

The flexibility of *Great Plains* is further demonstrated in its inventory item-pricing features. Items can be priced by a flat dollar amount, a percent of list price, a percent markup, or a percent margin. An unlimited number of quantity price breaks can be designated for each item, with as many as five different price labels per break.

Items are tracked by serial number: upon the sale or transfer of items, the available serial numbers are displayed in their FIFO or LIFO valuation order for easy selection. For example, placing an order for an item with a FIFO valuation returns the oldest available serial number.


**FACT FILE**  
**EDITOR'S CHOICE**

**Great Plains Accounting Series, Version 5.1**


Great Plains Software Inc., 1701 SW 38th St., Fargo, ND 58103; (800) 345-3276, (701) 281-0550.

List Price: \$795 per module (for most modules); Network Manager, \$995 for unlimited users.

Requires: 640K RAM; Novell's Advanced NetWare 2.86 2.0A or later, 3Com's 3+ Share, IBM's PC LAN, or most DOS 3.1 standard network; DOS 3.1 or later. (Macintosh version available.)

In Short: A full-featured, easy-to-use network package that will meet the needs of most businesses. Its Executive Advisor is an innovative program that produces graphs and summary reports, enabling management to run an enterprise better.

CIRCLE #15 ON READER SERVICE CARD



# After centuries of practice, mankind perfects engineering calculations: MathCAD.

## Announcing MathCAD 2.5: The Dawn of a New Age.

What the historians will call it, only time will tell.

Perhaps the Century of Speed, or the Era of Ease. But whatever the name, this is the age of MathCAD 2.5, the only math package that looks and works the way you think.

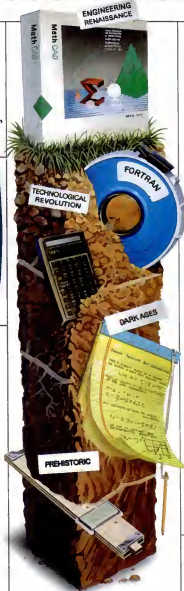


*MathCAD 2.5 includes 3-D plotting, HPGL sketch import, and PostScript output.*

MathCAD is far and away the best-selling math package in the world. Because it lets you perform engineering and scientific calculations in a way that's faster, more natural and less error-prone than the way you're doing them now—whether you're using a scratchpad, calculator, spreadsheet or program that you wrote yourself.

And now we've made the best even better. MathCAD 2.5 is a dramatically improved version that includes three-dimensional plotting, enhanced numerical analysis, and the ability to import HPGL files from most popular CAD programs, including AutoCAD.\* And now you can print on PostScript\* compatible printers.

And like before, MathCAD's live document interface\* lets you enter



equations anywhere on the screen, add text to support your work, and graph the results. Then print your analysis in presentation-quality documents.

It has over 120 commonly used functions built right in, for handling equations and formulas, as well as exponentials, differentials, cubic splines, FFTs and matrices.

No matter what kind of math you do, MathCAD 2.5 has a solution for you. In fact, it's used by over 50,000 engineers and scientists, including electrical, industrial, and mechanical engineers, physicists, biologists, and economists.

But don't take our word for it; just ask the experts. PC Magazine recently described MathCAD as "everything you have ever dreamed of in a mathematical toolbox."

And for Macintosh\* users, we present MathCAD 2.0, rewritten to take full advantage of the Macintosh interface. Entering operators and Greek letters into equations is pure simplicity!

Look for MathCAD 2.5 at your local software dealer, or give us a call. For more information, a free demo disk, or upgrade information,\* dial 1-800-MATHCAD (in MA, 617-577-1017).

*\*If you purchased MathCAD 2.0 between 5/1/89 and 6/16/89, you can get a FREE upgrade to version 2.5 (otherwise, the upgrade cost is \$99.00 until June 30, 1989; afterwards, the cost will be \$149.00).*

**PC**  
MAGAZINE  
EDITORS  
CHOICE

March 14,  
1989 issue.  
Best of '88  
Best of '87

# MathCAD®

MathSoft, Inc. One Kendall Square, Cambridge, MA 02139



## When you pick a printer for the office, the only thing you have to fear is being wrong.

An office printer can cost a few hundred dollars, or it can cost as much as a small car. And depending on how well it does (or doesn't do) what everybody in the office wants it to do, it can cost you a lot of sleep.



That's why when AEG Olympia talks about printers, the feature we talk about most is good technology. Which may explain why we're one of the leading business machine companies in our native Germany, where technology is a leading passion.

So before an AEG Olympia dealer tells you about all our dot matrix and daisywheel and laser printers, he'll probably show you how beautifully they all work. We live and breathe solid engineering, sensible design and dependable mechanics for printers, just as we do for our typewriters,

facsimiles, copiers and shredders.

For the name of our nearest dealer, call 1-800-999-6872. Or write AEG Olympia, Box 22, Somerville, NJ 08876-0022. You can't go wrong with good technology. **Where technology counts, business counts on us.**

**AEG**  
OLYMPIA





# ACCOUNTING SOFTWARE: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macola	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>ACCOUNTS RECEIVABLE</b>								
Maximum number of customers	65,535	30,000	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Maximum number of open transactions	65,535	30,000	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited
Offers salesperson codes	●	●	●	●	●	●	●	●
Maintains date and amount of last sale	●	●	Date only	●	●	●	●	Date only
Maintains high balance due in past 12 months	○	○	●	●	●	○	○	○
Maintains average days-to-pay (past 12 months)	●	●	○	●	●	○	○	○
<b>A/R FUNCTIONS</b>								
Supports multiple cash accounts for cash receipts	●	○	●	●	●	●	●	●
Has date-triggered recurring batches	○	○	○	●	●	○	●	●
Has user-triggered recurring batches	●	●	●	●	●	○	●	●
Tracks recurring batches by amount received	○	●	○	●	●	○	○	●
Allows multiple A/R accounts	●	●	●	●	●	○	●	●
Writes off small differences between receipts and invoices	○	○	○	○	○	○	●	○
Tracks commissions based on gross profit or invoice totals	●	●	●	●	●	●	●	○
Links commissions to payroll module	○	○	●	○	○	○	○	○
<b>A/R REPORTS</b>								
Automatic (recurring) billing	●	●	●	●	●	●	●	●
Limits statement printing for past-due customers	●	●	●	●	●	●	●	●
Sales analysis by customer category	●	●	●	●	○	●	○	●
Overdue aging report	●	●	●	●	●	○	○	●
Year-end statement	●	●	○	●	●	○	●	○
Sales analysis by product	●	●	●	●	●	●	●	●
Cash forecast by due date	○	●	●	●	●	●	●	○
Pick tickets	●	●	●	●	●	●	●	○
User-defined aging periods	●	●	●	●	●	●	●	●
User-specified aging for trial balance reports	●	●	●	●	●	●	●	●
User-designed invoices	●	○	●	○	●	○	○*	○
User-designed statements	●	○	●	○	●	○	○*	○
Detail deposit slips for cash received	○	●	○	○	●	○	○	○
Report of cash discounts not taken	○	○	○	○	○	●	○	○

■—Editor's Choice ●—Yes ○—No

\*SBT Database Accounting Library cannot perform this task within the compiled version of the software, but the task can be accomplished within the dBASE environment.

CONTINUES

The vendor inventory screen allows the addition of multiple vendors to each inventory item. Each vendor can maintain a listing of its price and the lead time required for the purchase of that item. This is an excellent feature to have when you need to have purchasing and alternative-vendor information.

Location and bin numbers can be as-

signed, and items can be categorized according to your own system. Assembly components, goods, services, labor, and supplies can be defined and their assembly into finished products recorded. These features, combined with above-standard inquiry and reporting capabilities, make this system hard to outgrow no matter what your requirements are.

## REPORTING FEATURES

The flexibility of *Great Plains*'s reporting is excellent: each standard report has a wide range of sort fields available. For example, a customer report can be sorted on the name, number, ZIP code, contact, telephone number, salesperson, or customer type. System setup allows the user to specify direct output to a designated printer or

# Systems of Choice

## QUALITY AT AN AFFORDABLE PRICE

**PC**  
MAGAZINE

The Dataworld's DATA 386-20 and DATA 386-25 stand out in the 30- and 25-MHz categories for speed and quality construction." (Play 30, 1989)

**PC**  
MAGAZINE

The Dataworld's DATA 386-20 minitor and Data 386 full-size tower are good values and first-rate performers from an up-and-coming retail order line.

**PC**  
MAGAZINE

The Dataworld offers a 16-bit video system with a top-quality NEC Putterfly monitor and a successfully test drive computer for an impressive performance... from a vendor with an increasing reputation for quality." (Play 30, 1989), 16 MHz system.

**PC**  
MAGAZINE

The Portacom II is a value leader with fast memory, a fast video controller and a terrific keyboard... Remarkably cheap powerful operation... superceded the other 286's." (Oct. 11, 1988)

### SYSTEMS BUILT WITH QUALITY AND CARE.

At Dataworld, we know there's no substitute for quality. Every part, every circuit, every peripheral we use is one of the finest products in its class.

We know that cutting corners only lessens reliability. You'll find our systems work faster, more efficiently, and more reliably than comparable higher-priced systems. And since you buy factory-direct from Dataworld, you benefit from the most competitive prices available.

### CAN'T WAIT FOR A SERVICE TECHNICIAN? INTRODUCING DATAWORLD'S REMOTE DIAGNOSTIC SERVICE.

With a Dataworld computer system, you may never have to wait for an on-site service technician again. This is because each system we sell comes with the "host" portion of pcANYWHERE III® (PC Magazine Editor's Choice)—the most advanced remote software ever developed for a PC. With your phone line and modem, our technical staff can use pcANYWHERE... to diagnose problems and provide solutions, thereby minimizing your downtime.

### OUR SYSTEMS WIN AWARDS. REPEATEDLY.

Our 386/16, 386/20 and 386/25 computers recently were awarded Editor's Choice by PC Magazine and we received high marks from Byte magazine. Last October, our Portacom II also received Editor's Choice. Last July, our DATA-286 turned in the highest performance figures among the systems reviewed.

### OUR WARRANTY IS YOUR GUARANTEE.

Any system ordered from Dataworld includes a 30-day money back guarantee (shipping excluded). Our commitment to quality and customer satisfaction has made Dataworld one of the most respected companies in the industry.

Every Dataworld system also comes with a limited one-year warranty on parts and labor. During this period Dataworld will repair or replace any defective items returned. Prices are subject to change in any time.



#### DATA 386-20<sup>+</sup>

- STANDARD CONFIGURATION**
- Intel 80386-20 microprocessor
  - 1MB base memory, expandable to 16MB of 32-bit memory
  - 64K of 4-way associated, 256 static RAM cache
  - Socket for Intel 80387 numeric coprocessor
  - 1 32-bit, 1 8-bit and 8 16-bit slots
  - Dual hard/floppy controller
  - 1 2MB 5.25" floppy drive
  - Enhanced 101-key "Click" touch keyboard
  - 1 parallel and 2 serial ports
  - 230W power supply

#### AVAILABLE OPTIONS

- Full-size vertical case or mini-tower case
- RAM upgrade to 2-, 4-, 8-, 12-, or 16-MB using DIMMs and/or SRIMs
- Numeric coprocessors: 80387 or 80486
- 40MB to 300MB hard drives in MFM, RLL, ESDI, or SCSI interfaces
- 40MB - 120MB tape backup drive
- Available in standard monochrome (720x348, amber), standard VGA (640x480, color) or extended VGA (800x600 up to 1024x768, color)
- 1.44MB 3.5" diskette drive

Case	Standard	Options	Standard
386-20, 386-25	\$1,499	\$1,499	\$1,499
386-20, 386-25	\$1,499	\$1,499	\$1,499
386-20, 386-25	\$1,499	\$1,499	\$1,499
386-20, 386-25	\$1,499	\$1,499	\$1,499
386-20, 386-25	\$1,499	\$1,499	\$1,499

#### DATA 386-25<sup>+</sup>

- STANDARD CONFIGURATION**
- Intel 80386-25 microprocessor
  - 1MB base memory, expandable to 16MB of 32-bit memory
  - 64K of 256 static RAM cache
  - Built-in ROM setup and diagnostics with EGA-VGA resolution
  - Socket for Intel 80387-25 or 80486 numeric coprocessor
  - 1 32-bit, 8 16-bit and 1 8-bit slots
  - Dual hard/floppy controller
  - 1 2MB 5.25" floppy drive
  - Enhanced 101-key "Click" touch keyboard
  - 1 parallel and 2 serial ports
  - 230W power supply

#### AVAILABLE OPTIONS

- Full-size vertical case or mini-tower case
- RAM upgrade to 2-, 4-, 8-, 12-, or 16-MB
- Numeric coprocessors: 80387 or 80486
- 40MB to 300MB hard drives with MFM, RLL, ESDI, or SCSI interface
- 40MB - 120MB tape backup drive
- Available in standard monochrome (720x348, amber), standard VGA (640x480, color), or extended VGA (800x600 up to 1024x768, color)
- 1.44MB 3.5" diskette drive

Case	Standard	Options	Standard
386-25, 386-25	\$1,499	\$1,499	\$1,499
386-25, 386-25	\$1,499	\$1,499	\$1,499
386-25, 386-25	\$1,499	\$1,499	\$1,499
386-25, 386-25	\$1,499	\$1,499	\$1,499
386-25, 386-25	\$1,499	\$1,499	\$1,499

#### DATA 386-16<sup>+</sup> -20<sup>+</sup> -25<sup>+</sup>

- STANDARD CONFIGURATION**
- Intel 80386-16, -20, or -25 microprocessor
  - 1MB base RAM, expandable to 16MB of 32-bit memory
  - 25 MHz system features Intel 82385 cache controller with 32K 2-way set associative static cache
  - LSI EMS 4.5 driver supplied
  - Socket for Intel 80387 numeric coprocessor
  - 1 32-bit, 8 16-bit and 2 8-bit slots
  - Dual hard/floppy controller
  - 1 2MB 5.25" floppy drive
  - Enhanced 101-key "click" touch keyboard
  - 1 parallel and 2 serial ports
  - 230W power supply

#### AVAILABLE OPTIONS

- Full-size vertical case or mini-tower case
- RAM upgrade to 2-, 4-, 8-, 12-, or 16-MB
- Numeric coprocessors: 80387 or 80486
- 40MB to 300 MB hard drives with MFM, RLL, ESDI, or SCSI interface
- 40MB - 120MB tape backup drive
- Available in standard monochrome (720x348, amber), standard VGA (640x480, color), or extended VGA (800x600 up to 1024x768, color)
- 1.44MB 3.5" diskette drive

Case	Standard	Options	Standard
386-16, 386-20, 386-25	\$1,499	\$1,499	\$1,499
386-16, 386-20, 386-25	\$1,499	\$1,499	\$1,499
386-16, 386-20, 386-25	\$1,499	\$1,499	\$1,499
386-16, 386-20, 386-25	\$1,499	\$1,499	\$1,499
386-16, 386-20, 386-25	\$1,499	\$1,499	\$1,499

#### PORTACOMP II

- STANDARD CONFIGURATION**
- Intel 80386-12 microprocessor
  - 512K base memory, expandable to 4MB on board
  - Socket for Intel 80387-10 numeric coprocessor
  - Two available 16-bit expansion slots
  - Supermarket beech LCD 8" x 6" display, 480x400 resolution in CGA double-scan
  - Dual hard/floppy controller
  - 1 44MB 3.5" internal AND 1 2MB 5.25" external diskette drives
  - 30MB, 48MB hard drive
  - Enhanced 101-key "click" touch keyboard
  - 1 parallel and 2 serial ports
  - 8-pin external monitor output port
  - 150W power supply

#### AVAILABLE OPTIONS

- EGA gas plasma display
- Memory expansion to 640K, 1MB, 2MB, or 4MB
- 40 - 150MB hard drives with MFM, RLL, ESDI, or SCSI interface
- Numeric coprocessor 80387
- 3.6000 internal or external modem
- Carrying case

Case	Standard	Options	Standard
386-12, 386-12	\$1,110	\$1,110	\$1,110
386-12, 386-12	\$1,110	\$1,110	\$1,110
386-12, 386-12	\$1,110	\$1,110	\$1,110
386-12, 386-12	\$1,110	\$1,110	\$1,110
386-12, 386-12	\$1,110	\$1,110	\$1,110

#### PREFERRED COMPUTERS

# DATAWORLD®

## 1-800-736-3282

IN CALIF. 213-695-3777 FAX. 213-695-7078

3733 SAN GABRIEL RIVER PARKWAY, PICO RIVERA, CA 90660-1495

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# LAN APPLICATION SOFTWARE ACCOUNTING SOFTWARE

to choose from a selection of options at the time of printing.

The Report Maker Plus is an excellent resource that not only produces custom reports but also extracts important data from *Great Plains*. A preformatted report, or view, can be saved and quickly printed. Multiple files can be combined by selecting a field common to each file, creating a linked view of *Great Plains* files.

The Import Manager allows the importing of several other data types into *Great Plains*, including .DIF, .SDF, .TAB (Macintosh), and .FDX (IBM mainframe). While adding flexibility, the Import Manager does not compromise accounting controls.

The Executive Advisor addresses management's need to make business decisions quickly and accurately. It offers reports and graphs that display the accounting data in an easy-to-understand format.

In general, the documentation is strong and easily comprehensible. Each module includes an orientation manual for quick installation and setup, a learning guide to help the user gain hands-on experience with the system by using the sample data, and a reference manual that explains every feature and function in detail.

*Great Plains Software* offers a variety of support plans and training opportunities to meet its customers' requirements. All subscribers get unlimited technical support; *Great Plains* guarantees that if it cannot assist the caller immediately, calls will be returned within 1 hour.

The *Great Plains Accounting Series* is an excellent solution for most accounting environments. It is distinguished by its ease of use, functionality, reporting and inquiry capabilities, networking abilities, and commitment to customer satisfaction. This is a package not only for running your accounting department, but also for effectively managing your entire business.

## Macola

by Brian D. Callow and Timothy Lee

*Macola*, a descendant of *MCBA*, is a solid, comprehensive system well suited to distribution, manufacturing, construction, service business, and other accounting situations. Its outstanding processing performance in the multiuser aspects of our benchmark tests displays the maturity of *Macola's* product and the attention to de-



tail that has earned it top honors in micro-computer LAN-based accounting.

Version 4.0 consists of 13 comprehensive, fully integrated accounting, distribution, and manufacturing modules (in general, \$795 to \$895 each) that can be run on a standalone PC or on a LAN. Since *Macola* received the *PC Magazine* Editor's Choice award (September 15, 1987), the user interface has been upgraded to include a functionally oriented menu system, pop-up windows for field look-ups, a pop-up calculator that can transfer its results to the current data-entry field, and context-sensitive help that replicates the manual's text and incorporates word searching in the help file. In addition, the documentation is comprehensive and well written and includes a helpful glossary of terms. A revised manual with better graphics and indexing was unavailable in time for this review.

*Macola* takes advantage of Novell's Advanced Network System Fault Tolerance (SFT) Transaction Tracking System (TTS). The explicit TTS allows the system to use its resources to recover and restart a process in the event that a workstation or server is inadvertently shut down. It does this by storing file and transaction images on the hard disk and not rewriting the original file until the processing is finished. When the individual station or server is back on-line, the processing continues from the point where the job terminated.

Simplicity of installation is a plus, with each module requiring approximately 1.5MB of disk space. Up to 99 different companies can be maintained, with each company's data files resident in its own di-

rectory on the file server's hard disk.

Network Tools, *Macola's* menu password security system, can manage security on a network having 3 to 300 users. It relies on individual user profiles as well as function passwords. You can tailor an individual's profile to permit access to individual menu options within each module,

## MACOLA Suitability To Task

	0	1	2	3	4
General Accounting (GAAP)					✓
Financial Accounting					✓
Enterprise Management Reporting				✓	
Decision Support					✓

as well as require an additional password for high-risk areas, such as employee master files in payroll.

## PROCESSING MANAGEMENT

*Macola* uses a combination of transaction batch processing and on-line update and inquiry. In larger environments, batch processing ensures data integrity. For example, you can assign a person to review the vendor edit report to determine that vendor additions or revisions were correctly entered.



# ACCOUNTING SOFTWARE: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macola	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>ORDER ENTRY</b>								
Maintains and recalls data fields on a formatted screen for:								
Tax-exempt number	●	●	●	●	●	○	●	○
Commissions paid	○	●	○	●	●	○	○	○
Shipping method	●	●	●	●	●	●	○	○
Multiple ship-to locations	●	○	●	●	●	●	●	●
Credit rating	●	○	○	●	○	●	●	○
Sales (year-to-date)	●	●	●	●	●	●	●	●
UPS zone code	○	○	●	●	○	○	○	●
Average number of days to pay by customer	●	●	○	●	●	○	○	○
Credit hold check	●	○	●	●	●	○	●	○
Credit limit check	●	●	●	●	●	●	●	●
<b>O/E FUNCTIONS</b>								
Quick add of inventory items	●	●	○	●	●	●	●	○
On-line lookup of alternate items on hand during order entry	●	●	●	●	●	●	●	●
Line-item discount application	●	○	●	●	●	●	○	○
Pricing table for markups or discounts based on customer type	●	●	●	●	●	●	●	●
Maximum number of line items	65,535	200	32,767	999	Unlimited	Unlimited	Unlimited	Unlimited
Generates COD shipping labels	●	●	●	○	○	○	○*	○
Generates UPS-approved mailing labels	●	●	●	○	○	○	○*	○
Calculates multilevel taxation	●	●	○	○	●	○	○	○
Calculates discount on gross sales before tax and freight	●	●	●	●	●	●	●	○
Computes sales commission	●	●	●	●	●	●	○	●
Has multiple currency support for international business	●	○	○	○	○	○	●	○
<b>O/E REPORTS</b>								
Back-order reports	●	●	●	●	●	●	●	●
Cancelled and completed orders	●	●	●	●	●	○	●	○
Inventory commitment	●	●	●	●	●	○	●	●
Packing list	●	●	●	●	●	○	●	○
Bill of lading	●	●	○	○	○	○	○	○
Sales commissions due	●	●	●	●	●	○	○	●
Past-due list	○	●	●	●	●	○	●	●

■ — Editor's Choice ● — Yes ○ — No

\*SBT Database Accounting Library cannot perform this task within the compiled version of the software, but the task can be accomplished within the dBASE environment.

CONTINUES

Standard transaction posting registers note the source journals and batch numbers on individual line items to maintain full audit-trail reporting of transactions. Deferred processing, an exciting new feature, allows you to queue a batch process or a list of commands to run at a specified date and time. You can optimize system throughput

by using fast (20-MHz 286 or 20-plus-MHz 386) diskless workstations and by scheduling posting operations or print jobs during nonpeak hours. If you specify a default workstation to process the jobs, it needs to be logged on and inactive at the specified time to begin the process. Otherwise, the system will hold the task.

## GENERAL LEDGER

The maturity of the G/L is evident in its refined processing of tasks that save labor, such as recurring entries and automatic reversal of accrual entries. Automatic distributions of journal entries by percentage can serve as time savers during data input.

Macola's chart of account coding struc-

# 30-Day Money Back Guarantee

## Absolutely Positively No Questions Asked!

### THE POWER.

ACCESS is the centerpiece of your entire computer-office management system—to reduce your workload—increase productivity. At a price you have to see. But more about the price later. -- First,

### THE FLEXIBILITY.

The ACCESS is custom-built to fit your needs, your work style, and your budget. Your hand assembled system is put through an exhaustive technical checklist and bench-tested a full 48-hours.



### THE CONFIDENCE.

We offer what the competition doesn't—a 3-year limited warranty on parts, free technical support and computer consultant toll-free "hotlines"—where you'll receive clear answers to any ACCESS questions (go ahead, give us a try at 1-800-233-8950)

### THE PRICE.

Receive not only the amazing price but a full 30-day money back guarantee on your first system.

#### ACCESS Turbo XT/10

- 8-bit 8086 4.77/10MHz Processor.
- 512KB RAM expandable to 640KB.
- Eight 8-bit slots.
- One parallel, serial, and game port.
- 102-key "AT" style keyboard.
- 360KB 5 1/4" floppy disk drive.
- Four 1/2 height drive bays.
- 150 watt high capacity.
- IBM XT compatible EROS BIOS.
- Clock/Calendar with Battery Back-up.

**\$539**

System Configurations:

	20MB-45ms	30MB-45ms	40MB-28ms
Mono	\$679	\$709	\$1,109
EGA	\$849	\$879	\$1,319
VGA	\$1,029	\$1,059	\$1,499

#### ACCESS 286/12

- 16-bit 80286 6/12MHz Processor.
- 512KB RAM expandable to 1MB.
- Eight slots: (6-16 bit, 2-8 bit)
- One parallel port and serial port.
- 102-key "AT" style keyboard.
- Five 1/2 height drive bays.
- 1.2MB Hi-density 5 1/4" floppy drive.
- 200 watt high capacity.
- 100% IBM AT compatible.
- Clock/Calendar with Battery Back-up.

**\$895**

System Configurations:

	20MB-45ms	40MB-28ms	80MB-28ms
Mono	\$1,299	\$1,499	\$1,499
EGA	\$1,599	\$1,899	\$1,999
VGA	\$1,799	\$1,999	\$2,199

#### ACCESS 386/16

- 32-bit 80386 8/16MHz Processor.
- 1MB RAM expands to 10MB
- Eight slots: (1-32 bit, 5-16 bit, 2-8 bit)
- One parallel port and serial port.
- 102-key "AT" style enhanced keyboard.
- 1.2MB Hi-density 5 1/4" floppy drive.
- Five 1/2 height drive bays.
- 200 watt high capacity.
- Phoenix Compatible BIOS.
- Clock/Calendar with Battery Back-up.

**\$1695**

System Configurations:

	40MB-28ms	80MB-28ms	150MB-28ms
Mono	\$2,299	\$2,499	\$3,299
EGA	\$2,699	\$2,899	\$3,699
VGA	\$2,799	\$2,999	\$3,799

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- Tops Thomas Control
- SCO-Unix Gateway
- Proton Orchid
- Standard Micro Systems

Our ACCESS family of 8088, 80286, and 80386 based computers can be configured around your needs for workstations and user servers.

Ask us how to design the ACCESS 386/20 Tower (shown below) around your networking and/or multi-user application

## NETWORKING

### Complete Network System

286/12MHz (2MB) File Server,  
10MHz 512K Workstations,  
Arcnet Interface, Loaded Network,  
Ready to Turn ON!  
(Active Hub not included.)

4 User (40MB)	\$ 5,995
6 User (40MB)	8,799
8 User (40MB)	10,300
ACCESS 10MHz WkSta.	695

<b>Novell</b>	
ELS 4-User Level-1	499
ELS Level-II V2.15	1,099
Adv. NETWORK 286 V2.15	1,995
SFT NETWORK 286 V2.15	3,095

<b>Interface Cards</b>	
ARCNET (8-bit) PC/XT	129
ARCNET (16-bit) 286/386	299
ARCNET MCA PS/2	299
Active Hub	299
ETHERNET (8-bit) PC/XT	239
ETHERNET (16-bit) 286/386	289
ETHERNET MCA PS/2	359
*Novell Trained & Authorized Sales and Support	

## MONITORS

<b>Amdek</b>	
Video 410 TTL Monochr.	\$145
Color 732 PS/2 VGA	399
SmartScan 735 MultiScan	469

## Super Buy



SEIKO  
CM1430 14" VGA  
Display  
**\$519**

<b>Magnavox</b>	
78M623 12" TTL Amber	\$ 85
CM8762 14" Comp/RGB	249
9CM053 14" HiRes EGA	339
9CM062 14" VGA Color	349
<b>Mitsubishi</b>	
DiamondScan 13" Display	499
NEC	
Multisync 2A	499
<b>Packard Bell</b>	
PB-1272 12" TTL Mono	79
PB-1422EG 14" HiRes EGA	359
<b>Wyse Terminals</b>	
WY-30, 50, 60	Call
<b>Zenith</b>	
ZFM-1490 14" VGA Analog	629

## MULTIFUNCTION CARDS

<b>AST</b>	
Six Pak Plus Board	\$129
VGA Plus Adapter	389
Rampage/286 512K	399
<b>Boca Research</b>	
BocaRam/AT 0-4MB Board	149
Boca MCA Serial/Parallel	145
Boca MultiEGA	149
<b>DCA</b>	
Irma Convertible 3	469
<b>Emerald</b>	
3XTwin Local 5251 Emulat.	Call
<b>Everex</b>	
Micro Enhancer EGA	149
Ram 3000 Deluxe 0-3MB Bd.	89
View Point VGA 256K	279
<b>5th Generation</b>	
Logical Connection 256K	439
<b>Headland</b>	
Vega Deluxe Adapter	209
Vega VGA Adapter	249
<b>Hercules</b>	
Graphics Card Plus	169
VGA Card	199
<b>Intel</b>	
AboveBoard Plus w/512K	429
AboveBd. Plus I/O w/512K	499
Inboard 386/PC 80386 CPU	579
Visual Edge	449
8087 PC/XT Coprocessor	89
80287-8 18M XT 8MHz CoP	209
80387-16 16MHz 80386	369
<b>Orchid Technology</b>	
TinyTurbo 286	229
ProDesigner VGA Adapter	319
<b>Renaissance</b>	
VGA 640x480 256K Pal	179
VGA 800x600 256K Pal	239

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### ACCESS Tower 386/20

- 32-bit 80386 8/20MHz Main System Board
- IMB 32-bit DRAM subsystem, expandable to 9MB
- Eight slots 2 32-bit, 5 16-bit, 1 8-bit
- 8MHz bus clock, wait state selectable
- Supports 80387 Math Coprocessor
- One parallel port and two serial ports
- 102-key "AT" style enhanced keyboard
- 1.2MB Hi-density 5 1/4" floppy disk drive
- Five 1/2 height drive bays
- Western Digital 1:1 interleave dual floppy/hard controller
- 200 watt high capacity power supply
- COMPAQ compatible, 32% faster than COMPAQ 386
- Norton SI Rating V4.0 22.5MHz
- 64KB and setup and diagnostic utility built-in
- Clock/Calendar with Battery Back-up

**\$2099**



#### System Configurations:

	40MB-28mhz	80MB-28mhz	110MB-23mhz
Monor	\$2,699	\$3,899	\$3,899
EGA	\$3,099	\$3,299	\$4,099
VGA	\$3,199	\$3,399	\$4,199



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<b>Anchor</b>	
1200 Baud External	\$ 99
2400 Baud External	159
2400 Baud Ext. w/MNP 5	269
<b>Everex</b>	
Evercom 24+ 2400 Baud Int	149

## Hot Special



EVEREX  
Evercom 2400 Ext.  
**\$179**

<b>Hayes</b>	
Personal Modem 1200	129
SmartModem 1200 Baud	275
SmartModem 2400 Baud	419
<b>Intel</b>	
2400B Classic Internal	169
PS/2 2400B Internal	249
2400EX External	199
<b>Murata</b>	
M1200 Facsimile	599
<b>Panasonic</b>	
UF-140 Panafax	799
<b>Practical Peripherals</b>	
1200 Baud Internal	65
1200 Baud Stand Alone	84
2400 Baud Internal	135
2400 Baud Stand Alone	179
<b>Sharp</b>	
FX-220 Facsimile Machine	699
<b>The Complete PC</b>	
Complete Fax 4800 Board	259
Complete Answering Machine	229

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<b>Miniscribe</b>	
3630 40MB 5 1/4" 61Msec	\$329
6085 70MB 5 1/4" 28Msec	599
<b>Mountain Computer</b>	
TD-4000 40MB Int. Tape	369
TD-8000 80MB Int. Tape	445
<b>Plus Development</b>	
20MB HardCard	499
<b>Seagate</b>	
ST-225 20MB w/cont	249
ST-238 30MB w/cont	289
STI-251-1 40MB 28ms	349
<b>Sysgen</b>	
Bridge-File 5 1/4" External	249
Bridge-Tape 40MB Tpbk	449
Omni Board Controller	79
<b>WELTEC Laptop Subsystems</b>	
FDD, Nec, Toshiba, Zenith	199
20MB Portable Hard Drive	849

## PRINTERS

<b>Alps</b>	
Allegro 24 24-Pin Flatbed	\$319
<b>Brother</b>	
M-1709 240cps, 132 Col	369
HR-20 20cps Daisywheel	329
<b>Epson</b>	
LX-810 200cps, 80 Col	179
FX-850 264cps, 80 Col	339
FX-1050 264cps, 132 Col	Call
LQ-510 180cps, 24-Wire	339
LQ-850 330cps, 24-Wire	Call
LQ-1050 330cps, 132 Col	Call
<b>Hewlett Packard</b>	
Thinkjet 2225	329
Pacific 25-in-One HP Font	279
Pacific 1-2-4 HP-LJ Memory	339
<b>NEC</b>	
P2200 Pinwriter 24-Wire	359
P5200 Pinwriter 265cps	519
LC-890 PostScript Laser	3295
<b>Okidata</b>	
ML-172 180cps, 80 Col	199
ML-320 300cps, 80 Col	359
ML-390 270cps, 24-Wire	499

<b>Panasonic</b>	
KX-P1180 192cps, 80 Col	185
KX-P1191 280cps, 80 Col	239
KX-P1524 24-Wire, 132 Col	539
KX-P4450 Laser	Call
<b>Seikosha</b>	
SP1600AI 160cps, 9-Pin	179
<b>Star Micronics</b>	
NX-1000 140cps, 80 Col	159

## COMPUTERS

<b>AST</b>	
Bravo 6x Premium 286/386	Call
<b>Compaq</b>	
Desktops and Portables	Call
<b>IBM</b>	
PS/2 Mod-30/286 w/20MB	1999
<b>NEC</b>	
UltraLite and ProSpd Laps	Call
<b>Panasonic</b>	
Business Partner 80286	\$839
<b>Toshiba</b>	
T1000 8088 Laptop	639
T1200 and T1600 Laptops	Call
<b>Zenith</b>	
MiniSport 1MB Laptop	NEW
286 and 386 Desktops	Call

## I/O DEVICES

<b>Chicon</b>	
DS-3000 Scanner	\$569
<b>Houston Instr.</b>	
9012 HIPAD +12"x12" Tab.	399
PC-095A 4-Pen A&B Plotter	599
<b>IMSI</b>	
OptiMouse	75
<b>Logitech</b>	
New Lotitech Mouse M9	79
ScanMan 400DPI HiRes	189
<b>Microsoft</b>	
Serial or Bus Mouse	109
<b>MSC</b>	
OmniMouse	39

## Super Savings Special



PANASONIC  
KX-P1124  
24-Wire

**\$319**

<b>Seiko</b>	
DT-3503 Digeizer	\$379
<b>SummaGraphics</b>	
SummaSketch +12"x12"	399
<b>The Complete PC</b>	
Complete Handscan 1/2 Page	169
Complete Full Page Scanner	579

## SOFTWARE

<b>Aldus PageMaker</b>	\$469
Ashton-Tate dBase IV	459
Ashton-Tate MultiMate II	289
BLOC Form Tools	55
Borland Turbo	159
Borland Quattro Pascal V5.5	99
Central Pt. PC Tools Deluxe	50
Central Pt. PC-II Opt. Board	119
DAC-EASY Accounting	60
DataStorm ProComm Plus	49
Delrina Peer: Form	159
5th Generation FastBack +	98
FontBase+ Development	199
Fixx Sideways	40

<b>Harvard Graphics V2.1</b>	\$289
<b>IMSI TurboCAD</b>	59
<b>Intuit Quicken</b>	33
<b>Lotus 1-2-3</b>	299
<b>MECA Managing Your Money</b>	119
<b>Microcom CarbonCopy +</b>	119
<b>MicroPro WordStar 5.5</b>	239
<b>Microvix R:BASE For DOS</b>	439
<b>Microsoft Windows 286</b>	70
<b>Microsoft Quick Basic V4.5</b>	69
<b>Nantucket Clipper</b>	419
<b>Nolo Press For The Record</b>	38
<b>PaperBack VP-Planner +</b>	119
<b>Peachtree Accounting</b>	169
<b>Peter Norton Adv. Utilities</b>	80
<b>Quarterdeck DESQView 2.02</b>	80
<b>SPC: 1st Choice 3.0</b>	90
<b>SPC: 1st Publisher 2.0</b>	80
<b>SPC: Professional Write</b>	149
<b>TOPS For DOS</b>	119
<b>TOPS Inbox P. LAN</b>	339
<b>Traveling Lap-Link +</b>	85
<b>WordPerfect 5.0</b>	219
<b>Xerox Ventura Publishing</b>	459

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CIRCLE 185 ON READER SERVICE CARD

ture is based on five-character prime and subaccount codes (AAAAA-AAAA). You may use fewer characters, like a four-three (AAAA-AAA) scheme, to meet your requirements and make use of the more sophisticated features. Departments may be grouped into as many as 36 entities for reporting purposes. Automatic consolidation of results for companies with different account structures is accomplished by specifying a multicompany consolidation account for every individual account in each company.

Posting account distributions from transactions in other modules to the G/L can be done in date summary (one record for each account for each date), in period summary (one debit record and one credit record for each account in the distribution file), or in detail.

A comprehensive journal history report displays all of the batch-posting totals from other packages and shows net changes to receivables, payables, and cash. Posting in detail can help answer such typical management questions, as "Where did these numbers come from?" A consolidation feature lets you compress and purge the detail by date and account ranges in order to trim growing files.

Unlike other modules, G/L requires no month-end closing procedure. There is both a temporary and a final close for year-end figures. The temporary close can be used to accommodate entry adjustments that arise as a result of reviews or audits. If adjustments are necessary after a final close, a one-sided entry is needed to close a net gain or loss in the equity accounts. As a supervisor, it is important to restrict the use of this feature by password access and to limit it on the control file access option to the time you need to perform the change.

Financial reporting in the G/L is complete. The program supports sources and applications of funds, deals with statements of changes in financial position, tallies balance sheets, and handles profit-and-loss reporting, even making comparisons to budget and historical performance.

Report Writer, from Snow Software, is the custom report writer for all of *Macola* modules. This independent product works with a number of other software packages and allows you to link files for an individual report, easily perform user-defined queries, design reports with sorting and column and row math, and even export information in standard formats such as *Lotus 1-2-3*, *R:BASE*, and *dBASE*.

#### ACCOUNTS PAYABLE

*Macola's A/P* has time-saving features not found in many other systems. Numbered vouchers are input through a standard screen for regular, credit, prepaid, cancellation, and adjustment invoices. An automatic distribution function simplifies routine expense allocation, and recurring payables can be used for items not normally invoiced, such as rent.

The cash requirement reporting feature details potentially lost discounts and is complemented by payment selection based on the report criteria. You can place individual invoices on hold or add others to the batch. You can then use the pre-check writing report to verify that you are making the right payments to conserve your cash.

#### ACCOUNTS RECEIVABLE

*A/R* can handle regular and recurring invoices, adjustment memos, finance charges, and open-item or balance-forward payment methods on an individual customer basis. Data input is simplified by the use of a common input screen for all transaction types, as well as by pop-up windows for vendor and other codes.

The cash application process is well thought out for multiple bank accounts and offers ease of payment application for open items. You will be pleased with how quickly *Macola* generates customer aging reports, using up to four user-definable time periods.

*A/R* and Inventory are integrated with Customer Order Processing in a sophis-

cated and comprehensive package. Customer Order Processing is capable of processing quotes, orders (regular, standing, and blanket), invoices, and credits. It directly updates the customer, salesman, and commission files in *A/R*. Once accepted by your customer, quotes may be converted into an invoice. Blanket orders don't allocate inventory but indicate a measure of demand. Once stock receipts are noted in inventory, back orders can be automatically filled by the system.

During *O/E* inquiry, hotkeys pop up windows for account numbers, customers, vendors, orders, and inventory parts by item number or by description. Entering new vendors is easy, and the transaction report for vendors is handy for establishing procedures to ensure proper credit limits. Another feature, displaying account credit histories, is useful when the person entering the order has the responsibility for controlling the credit limit.

Your customer sales management can benefit from statistics such as year-to-date and prior-year sales, as well as the number of invoices, average days to pay, receivables aging, and cost of goods sold by customers.

Default fields on the customer master allow you to note substitute items, back orders, or partial shipments. These and other fields simplify data entry, save labor costs, and ensure efficient flexibility in servicing your customers. However, most data-entry screens require you to move through each field sequentially; it would be nice to be able to reorder the data-entry screen for efficiency and eliminate unused fields. One step in this direction is the ability to suppress item cost information.

Distributors and others who use quantity break pricing will be pleased with the ability to specify pricing schemes by percent or item dollar amount.

#### INVENTORY CONTROL

Inventory Control fully integrates Customer Order Processing with Purchase Order and Receiving. The inventory master contains a comprehensive set of information; a 15-character inventory code, reorder level, picking sequence, sales statistics on quantity sold and associated costs, lot number, serial number with warranty tracking, and location codes for multiple warehouses. Valuation methods include average cost, last cost, standard cost, FIFO, LIFO, and FISH (first-in, still-here).

Where applicable, recommended order quantities can be generated using opera-

#### PC FACT FILE EDITOR'S CHOICE

*Macola, Version 4.0*  
Macola Inc. 333 E  
Center St., P.O. Box  
485, Marion, OH 43031;  
(800) 468-0634, (614)  
382-5998

List Price: \$795 to  
\$895 per module (for  
most modules); System  
Manager: \$495 for first 5  
users, \$995 for each 5-  
user addition.

Requires: 640K RAM; Novell's *Advanced NetWare 286 2.0A* or later, 3Com's 3+ Share, IBM's *PC LAN*, or most DOS 3.1 standard networks; DOS 3.0 or later.

In Short: A comprehensive, fully integrated, reliable system capable of processing high transaction volumes in both multiuser and standalone environments. A good, easy-to-learn user interface. Source code is available.

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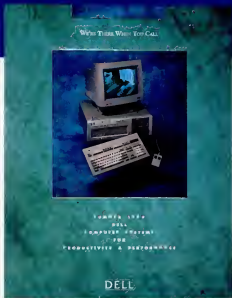
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# ACCOUNTING SOFTWARE: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	AccPac Plus	Data Pro Accounting Series	Great Plains Accounting Series	Macrole	Platinum Series	RealWorld Accounting System	SBT Database Accounting Library	Solomon III
<b>INVENTORY</b>								
Number of item-code characters	16	20	15	15	18	15	15	15
Year-to-date cost of sales	●	●	●	●	○	●	○	●
Committed quantity	●	●	●	●	●	●	●	●
Last sale date	●	●	○	●	●	○	●	○
Multiple vendors for same item	●	●	●	●	●	●	●	●
Average costing	●	●	●	●	●	●	●	●
Standard costing	●	●	●	●	●	○	○	●
Last-in-first-out/First-in-first-out	●	●	●	●	●	○	○	●
Number of layers for FIFO	5	20	Unlimited	Unlimited	Unlimited	Unlimited	N/A	Unlimited
Number of price levels	5	10	5	10	10	5	3	Unlimited
Discount quantities	●	●	●	●	10	●	●	●
Discount percent	●	●	●	●	●	●	●	●
On-line graphs built into inventory module	○	●	○	○	○	○	○	○
Price by customer class	●	●	●	●	●	●	○	●
Price by product class	●	●	●	●	●	○	○	●
Markup pricing	●	●	●	●	●	●	●	○
Fractional pricing	●	●	●	●	●	○	○	●
Prior total of 12-period sales (quantity and dollar amount)	●	●	●	●	●	●	●	○
User-specified units of measure	●	●	●	●	●	●	●	●
Each part number allowed to have its own G/L distribution	●	●	●	●	●	●	●	●
Bar-code label printing	○	●	○	○	○	○	●	○
<b>INVENTORY REPORTS</b>								
Inventory price list	●	●	●	●	●	●	●	●
ABC analysis	●	●	●	●	○	●	●	○
Serial number aging report	○	○	●	●	○	○	○	○
Inventory turnover trend report	●	●	●	●	●	●	○	○
Log of transfers between warehouses	●	●	●	●	●	○	○	○
Ranking by gross profit dollars	●	●	○	●	○	●	○	●

PC —Editor's Choice ●—Yes ○—No N/A—Not applicable; product does not have this feature.

ENDS

tions research techniques. The recommendation is based on lead time, forecasted usage, safety stock and safety factor, minimum order quantity and economic order quantity. Properly used, ordering can be optimized so as to maximize the return on your inventory investment. Exception reporting for variances of actual to forecast quantities are concise and help you exercise efficient control over inventory levels.

ABC inventory analysis allows grouping of stock by priority. For example, food distributors may use an item's perishability period, a precious metals dealer may use value of inventory, and a distributor may

base classes on revenue—Class A items might represent 80 percent of revenue yet only 20 percent of inventory items. ABC reports are easy to comprehend and allow close monitoring of inventory performance to exploit revenue trends and to trigger corrective measures.

Physical counts are distinguished by a "cycle code" and a handy two-part "tag" process. The cycle code can follow from your ABC analysis and can help address seasonal stock in a timely manner. The tag process eliminates the need to manually total tags of like items before updating inventory on the computer. Once the counts

are entered, adjustments are automatically calculated and a register is printed with details of the adjustments.

The Bill of Materials module is well suited to tracking assembly operation and sequence number. It allows a single inventory item to be made from other items: when an order is entered for the finished item, stock allocation, back order, and out-of-stock conditions are noted at the detail level. For example, if a computer dealer sells a PC package that consists of a computer, a monitor, and DOS software, it will allocate each of those items when an order for a single package is placed.

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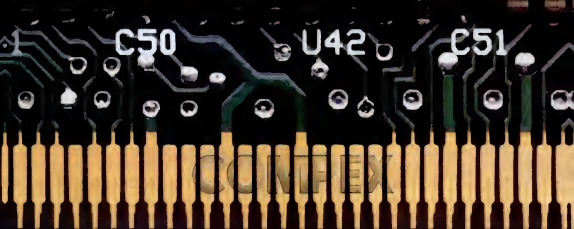
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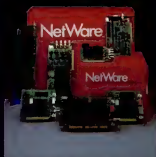
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## PURCHASE ORDER AND RECEIVING

Tracking vendor performance for supplier negotiations is one immediate benefit of adding the Purchase Order and Receiving module to your Inventory Control and A/P modules. It handles entry, printing, and monitoring of normal, blanket, and drop-ship orders, with automatic update of vendor accounts and inventory items. On-hand, allocated, on-order, and reorder amounts are displayed on each item in the O/E tally.

Your operations can be aided by controlling stock transfer among locations and flagging items as urgent to ensure that the appropriate person is notified upon a shipment's arrival. As transactions are posted, the vendor master record is updated to prepare performance reports for purchases, number of orders for the year to date, average lead time and number of days late, late receipts by number and line item, and number and percent of rejected shipments. Accurate and comprehensive records should store facts to aid in vendor assessment for selection and terms negotiations. Comprehensive reporting includes cash projection based on outstanding purchase orders.

## CUSTOMIZING MACOLA

Companies often change procedural or administrative aspects of their operation to accommodate accounting software. In some cases, it would be less expensive to modify the software for a better fit. Source code for *Macola* is available for \$795 per module. If you don't want to make the changes yourself, many resellers, as well as *Macola's* own Custom Software group, offer customization services, albeit for a hefty price.

While many companies can satisfy their need for job-costing functions using the feature found in A/P and Payroll, a Job Costing module is available as a stand-alone or integrated application. Material Requirements Planning, Master Scheduling, and Standard Product Routing round out *Macola's* manufacturing modules. Fixed Assets contains the essentials for recording assets.

*Macola* is a comprehensive, fully integrated, reliable accounting system with outstanding processing performance in multiuser environments. It is suited to a wide variety of industries and accounting situations. The many strengths of this product make it a fine choice to fulfill your multiuser accounting needs, no matter how complex or strenuous they may be.

## Platinum Series

by Raymond August, Dave Columbe,  
and Danette F. Quiring

If you need an accounting package that doesn't compromise functionality for speed, take a look at Version 6.0 of *Platinum Series* from Advanced Business Microsystems. This is a strong, fast, full-featured multiuser package well suited to organizations with sophisticated accounting needs, complex information analysis requirements, or high-volume processing needs. Most modules for the package cost \$795.

Good application design and the use of Novell's *Btrieve*, one of the fastest file managers available today, results in stunning performance. *Btrieve's* speed helped *Platinum* achieve superior marks on the Concurrent Printing of Reports benchmark test: it proved to be almost twice as fast as the nearest competitor. However, *Platinum's* benchmark test times during the posting processes, while still among the best, did show the slowing effects of index building.

Fast reporting is complemented by *Platinum's* ability to maintain transaction detail for prior periods, limited only by the size of your hard disk. Managers can use this to analyze seasonal trends by preparing reports that show monthly results for the last 5 years.

Custom reporting is a cornerstone of *Platinum's* solid foundation. Reports can be printed using a vast range of sort keys and logic to select the range of items to print, to specify the components contained in each column, and to define how each column should be calculated. Any requests can be saved and added to a custom menu, allowing the user to create reports with special requirements easily.

Dynamic menus list only installed modules but may be customized to allow access to another application program, such as a word processor or spreadsheet, from within *Platinum*. Using the *Platinum* menu structure to furnish a consistent environment for every accounting user on your network can save workstation memory and minimize training costs.

A "backwriting" feature allows you to add an inventory item, vendor, or customer while invoicing, vouchering, or updating inventory. A high level of control is available through optional password ac-

cess and a transaction edit report, allowing only appropriate individuals to confirm terms, credit limits, and default settings.

An Enhanced Spreadsheet Interface allows exporting of any G/L financial report into a Lotus 1-2-3 .WK1 or Microsoft Excel file format. All cell formula definitions are automatically included; for example, totals are written as @SUM functions. This is a labor-saving feature when you want to do financial modeling, but more impressive is the ability to import your spreadsheet data into *Platinum's* budget fields. This efficiency puts most main-frame systems to shame and may even make you look forward to your budgeting.

Context-sensitive help screens offer minimal information, but you can add your own help notes in the special blank screens provided. This nifty feature can aid in training new operators, as well as in documenting procedures and policies for infrequent operations, such as year-end closings.

Reading through the extensive documentation helps familiarize the user with this complex system. The manuals we received were in a state of transition: while the older documentation offered a somewhat weak presentation, the newer man-

PLATINUM SERIES  
Suitability  
To Task

	0	1	2	3	4
General Accounting (GAAP)					✓
Financial Accounting					✓
Enterprise Management Reporting					✓
Decision Support					✓

uals were concise and well organized. A separate publication, *Management with Platinum* (\$20), contains more than 200 pages of information on *Platinum's* features.

Function keys are used to navigate within the modules. For example, in certain screens the F3 key allows you to repeat data from fields in the line directly above. However, there are some operations that you may find awkward. For instance, help screens are displayed by pressing the Tab

## LAN APPLICATION SOFTWARE ACCOUNTING SOFTWARE

Platinum Series presents a lot of information in a small space. Its state-of-the-art interface is extremely detailed, allowing you, for example, to see a customer's phone number when using the pop-up point-and-shoot window to enter the customer ID number.

key, not F1. You may also get flustered by the fact that the command reference lines at the bottom of some data-entry screens are incomplete.

### GENERAL LEDGER

Unique features make *Platinum's* G/L exceptionally strong. The unique account structure chart supports complex reporting requirements and options to control data integrity in other modules. Strong allocation and recurring journal entry features, as well as provisional real-time reporting, make this a powerful module.

Users of prior versions of *Platinum* will be glad to see that the cumbersome multiple chart of accounts is gone. In the current system, you define one master chart of accounts to store only the G/L posting accounts. Then you may design up to 200,000 chart formats. A chart format is simply a report definition with the ability to total nonsequential accounts, use wildcards, insert format accounts, or include any other supported feature that allows you to produce your own custom-designed report. Revisions made to one format can be easily updated and copied to all other charts.

Module-specific charts of accounts may be created to limit access in another module to the accounts you specify. For example, you can establish a chart of A/P account numbers so that only these accounts are valid during data entry and are shown in the pop-up look-up windows, an effective control against mistakes.

If you currently allocate common costs across departments or divisions, you will welcome the automatic G/L allocation en-

try features. Entries can be defined in either dollar or percentage amounts to spread automatically among several account numbers, thus eliminating many manual journal entries.

*Platinum* goes beyond the normal recurring journal entries of most high-end accounting packages. These entries are user defined; you enter the accounts, debits, credits, and frequency. You can enter a balance for each transaction that will be reduced at each processing time until it becomes zero. This is a powerful way to prepare depreciation entries, for which it is necessary to make recurring journal entries until you obtain a specified balance.

Standard reports and journals, custom balance sheets, income statements, statements of changes in financial position, and supporting schedules and journals can be set up quickly and easily for current, historical, and comparative data.

*Platinum* uses a batch data-entry approach but also includes a provisional reporting feature that gives you all of the benefits of a real-time system strengthened by the accounting controls of a batch system. Provisional reporting allows you to print financial statements before actually closing or performing final postings. Provisional financial reports are useful in reviewing potential results and in identifying possible entry errors. To view current-period provisional financial statements, postings must be completed in all modules.

### ACCOUNTS PAYABLE

*Platinum's* A/P helps you accurately manage your cash disbursements. Up to nine user-defined aging periods on the cash re-

quirements report offer a concise summary of future obligations.

Purchasing efficiency can be improved with the product purchases report. This report includes purchase transaction details like purchase date, vendor, unit price, quantities purchased, and extended price. It can be printed for any range of vendor classes, items, or dates. Coupled with unlimited history files, that report will allow you to maintain an easily accessible and comprehensive base of information to query for assistance in stocking decisions.

The nightmare of tracking the individual and location responsible for each purchase can be eliminated by entering a branch field and a responsibility field for each voucher entered. Serial or lot number can be tracked on voucher line items. Unfortunately, lack of specific identification of an inventory item in the inventory module fails to fully exploit this feature.

### ACCOUNTS RECEIVABLE

The customer master file tracks information relevant to today's businesses: Telex and fax numbers, credit card information, default FOB, terms, ship-via, inventory location, territory, salesperson codes, and even a vendor key for information if the customer is also a vendor.

Invoices may be entered without orders or may access orders from Order Entry. Recurring invoices can be set up for 13 periods, for a specified cycle, or with an automatic cancellation by date or tracked balance.

Retailers, distributors, and some ser-

**FACT FILE**  
**EDITOR'S CHOICE**

**Platinum Series,**  
Version 6.0  
Advanced Business  
Microsystems Inc.,  
15615 Algon Place,  
#300, Irvine, CA 92715;  
(800) 999-1809, (714)  
727-1250.  
List Price: \$795 per  
module (for most  
modules); System  
Manager: first 3 users, \$1,095; each additional 3  
users, \$395.  
Requires: 384K RAM; Banyan's VINES, IBM's  
PC LAN, Novell's Advanced NetWare 286 2.0 or  
later, 3Com's 3+ Share, 3+ Open; DOS 3.3 or  
later.  
In Short: Platinum Series is a very fast and  
flexible accounting system that runs well on any  
network. It takes advantage of Novell's Strive  
VAP, making it a natural to be used with Novell  
operating systems.

CIRCLE 417 ON READER SERVICE CARD

# It All Adds Up.



Data Pro Accounting Software knows that being the most powerful accounting software package is not enough. It must be simple to be effective. Introducing the Data Pro Accounting Series, the new generation in accounting software.

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## Data Pro Accounting Software

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vice companies will be pleased to see a pricing feature that allows you to specify a time period for a sales promotion based on an inventory item, inventory location, customer class, or a combination of all three.

"Kit" (or "assembly") pricing is another nice feature. This idea allows a single inventory item number to represent an unlimited number of related items. A kit could be made up of several items, such as a computer, disks, sample software, a printer, and a modem—all logged under one sales price. When a kit is sold, all individual component inventory items will be automatically logged.

Elegant accounting for customers with multiple locations is accomplished by unlimited ship-to addresses per customer; each ship-to address maintains unique tax rate terms and salesperson and invoice comment fields. You specify address-sensitive information by location rather than relying on a single set of defaults in the vendor master file.

Commission accounting allows commissions to be paid using total sales or gross profit, or by a particular inventory class or item. These may be tracked by both month and year-to-date and are available in on-line inquiry.

#### ORDER ENTRY

Orders can be entered, posted, or selected and posted as invoices without using the A/R screens. Customer credit limits and balance amounts, as well as inventory items, are automatically updated during the data entry and posting procedures.

The order entry screen is consistent with the A/P voucher entry and is helpful in reducing the learning curve when switching between modules. Unlimited descriptions can be included for each item when entering line-item detail for orders, further clarifying the invoice.

#### INVENTORY

Platinum's Inventory module allows inventory items to have many options, including reference to two vendors; multiple location links; organization by user-defined classes; default revenue; purchase, commission, and tax accounts for posting to G/L; weights for shipping purposes; maximum/minimum reorder quantities; expected reorder lead time; and scheduled physical inventory date. There is even an option to specify an alternate item during an out-of-stock condition, helping you to avoid losing sales.

Costing options include LIFO, FIFO,



## LAN APPLICATION SOFTWARE — ACCOUNTING SOFTWARE ON A LAN

### HOW WE TESTED ACCOUNTING SOFTWARE

PC LAN Labs designed these tests to provide realistic results that will help you evaluate accounting programs in terms of your own needs. The test scores illustrate these products' relative power in a LAN environment.

In order to test the software at peak loads, we used a database that included 2,000 vendors, 18,000 Accounts Payable detail items, 20,000 inventory items, 5,000 customers, 25,000 Accounts Receivable detail items, and 46,000 General Ledger detail items. Even some mini-based systems don't carry this much information.

Two test LANs were assembled. LAN 1 comprised an IBM PS/2 Model 80 server with a 110MB hard disk, Novell's Advanced NetWare 2.12a, one AT&T 386-based workstation, and three 286-based Dell System 200s. It was used to install the individual modules' databases and validate them by generating reports, and to conduct nontimed tests for fault tolerance; field, file, and record locking; and security.

LAN 2 consisted of a 386-based Core server with a 600MB hard disk, 8MB RAM, Novell's Advanced NetWare 2.12a, one Compaq 386/20 workstation, one Dell System 200 workstation, one NCR 386 workstation, and two IBM PC ATs, one with and one without an 80287 coprocessor. This LAN tested data entry, posting, and reporting using both individual and concurrent transactions. None of the tests revealed significant differences caused by coprocessors since most accounting software does not exploit them.

We accepted the Novell default settings except in the case of *Solomon III*, which we ran first with a nondedicated server and then using a 1MB RAM 25-MHz Wyse machine as a dedicated database server. This way, we were able to accommodate the

MDBS database that is required for running Version 5.1 of *Solomon III*.

### DEFINING THE TESTS

Our primary challenge was to define tasks that all the programs could complete even though differences in their structure and design could affect their performance. We invited the vendors to help us design the tests; each vendor was required to load the database into its modules prior to testing.

The resulting tests cover three major areas. To test the first area, transaction processing, macros entered a standard batch of transactions at a rate faster than an expert order-entry clerk could achieve. Faster-than-human order entry allowed us to simulate the load of up to 15 typical workstations easily.

To test management reporting—the assistance a program provides in helping you make key decisions quickly—we had the software prepare aging and stock status reports of the type used to monitor cash, customers, and inventory. All printing requests were sent to spool files to prevent printer performance from affecting the overall results. The files were archived for later validation.

The third area we tested was the impact of concurrent processing, or degradation under increased load. We ran both data entry and reporting tests with a single user on the system and then ran the same tests with concurrent workstations running, adding one station and retesting until there were five. The entire testing routine encompassed more than 100 individual steps.

To ensure the integrity of the tests, we conducted them with the vendors present and assisting. Timing was done with stopwatches; the results were recorded by Price Waterhouse and verified both by the vendors and by PC Magazine staff.



## PERFORMANCE TESTS: ACCOUNTING SOFTWARE ON A LAN

PC LAN Labs' unprecedented testing of high-end multiuser accounting packages shows *Platinum* to be the top performer overall; *AccPac Plus*, *Great Plains*, and *Macola* also reveal individual moments of excellence. These tests prove that LANs have what it takes to pose a serious challenge to mini-based accounting systems.

In the Concurrent Printing of Reports test, we printed reports that would normally be used to perform a quick check-up on a company's condition:

- The stock status report assumed that all 20,000 inventory items were maintained in one warehouse and that each item was on a single line with its part number, description, in-stock and on-order quantities, price, and calculated value.
  - The A/P aging report added 18,000 detail items to 2,000 vendor master records based on a 30-, 60-, 90-, and over 90-day aging scheme.
  - The A/R aging report added 25,000 detail items to 5,000 customer master records based on the same aging scheme.
  - Since everything was to be posted to the General Ledger, the year-to-date detailed trial balance involved printing and adding approximately 47,500 detail items to 279 individual accounts.
  - The summary trial balance report told the balance of the 279 accounts.
- Date Pro* had a file limit of 32,000 records and was unable to post all the detail to the G/L. *SBT* posted distribution summaries only from the subsidiary journals. The ability to post detail from A/P or A/R is now a part of the program but was not a standard feature of Version 6.2, which we tested.

*Platinum's* excellent performance results from its efficient use of *Btrieve* indexing. *Solomon III's* bright point—its speed in turning out the summary trial balance—resulted from totals maintained and efficiently checked to provide logical fault tolerance. *Solomon III* and *AccPac Plus* both produced inventory reports that contained some additional information resulting in a larger output file, but probably not enough information to justify the extra time required.

#### Individual Tasks in the Concurrent Printing of Reports Test (Times given in minutes and decimal minutes)

	Solomon III	SBT Database Accounting Library	RealWorld Accounting System	Macola	AccPac Plus	Platinum Series	Great Plains Accounting Series	Data Pro Accounting Series
Print inventory stock status report	57.8	14.3	26.3	10.8	52.	16.7	26.7	16.9
Print A/P aging report in detail	36.9	26.5	19.6	17.1	12.1	10.0	11.8	15.7
Print A/R aging report in detail	74.5	45.2	73.4	18.6	22.3	20.6	70.1	18.7
Print year-to-date detailed trial balance	116.6	N/A	43.0	34.6	17.5	10.3	21.1	N/A
Print summary trial balance	0.9	N/A	15.6	23.7	9.0	0.4	6.3	N/A
<b>Total</b>	<b>286.9</b>	<b>N/A</b>	<b>179.9</b>	<b>104.7</b>	<b>113.2</b>	<b>57.9</b>	<b>136.0</b>	<b>N/A</b>

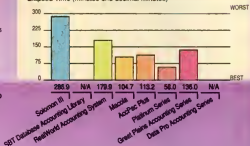
N/A—Not applicable: the product does not perform this task.

For the Data Entry test, we designed five transactions, each of which had five line items. Assuming a clerk could enter five orders a minute, we set up a macro to simulate that rate. When packages completed the entry in less than a minute, the result was recorded as a minute. *AccPac Plus's* performance on two machines with CGA monitors was about 20 seconds slower than that because of screen refresh techniques it uses to reduce snow. This is a nice feature, but it takes its toll in speed.

We conducted the tests using the stations as single users and entered 5 transactions for every station, except for one on which we entered 30. In a second pass, we timed 5 and 30 transactions for the first three workstations running concurrently, and in a third pass, we timed all five workstations running concurrently. The reported result is the grand total for one complete set of tests. A theoretically perfect time for all the transactions, based on our assumptions, would be 54 minutes. *Platinum* was the only package to achieve that result, though *Macola* and *Data Pro* were close runners-up.

#### Concurrent Printing of Reports

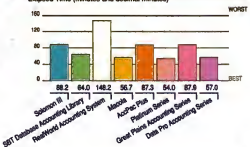
Elapsed Time (minutes and decimal minutes)



N/A—Not applicable: this product could not complete the test.

#### Data Entry

Elapsed Time (minutes and decimal minutes)





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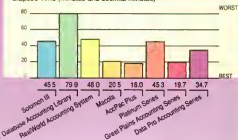


## PERFORMANCE TESTS: ACCOUNTING SOFTWARE ON A LAN

The Invoice Preparation and Detail Posting test prepared 290 invoices for printing, posted the detail for the orders, and printed the A/R distribution report in detail and summary. All the packages completed all the functions. Where times are not reported, the processes are combined into other steps. AccPac Plus's leading time is based on efficiencies built into its entry process.

### Invoice Preparation and Detail Posting

Elapsed Time (minutes and decimal minutes)



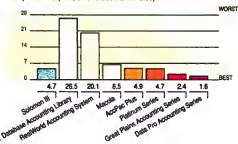
### Individual Tasks in the Invoice Preparation and Detail Posting Test

(Times given in minutes and decimal minutes)

	Solomon III	SBT Database Accounting Library	RealWorld Accounting System	Macola	AccPac Plus	Platinum Series	Great Plains Accounting Series	Data Pro Accounting Series
Post O/E file	0.0	0.0	0.0	15.1	0.0	0.0	0.0	0.0
Print Invoices	5.0	16.1	6.0	3.5	4.4	1.1	2.2	30.6
Post Invoices	0.0	0.0	36.6	0.5	8.8	21.6	0.0	0.0
Print audit	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0
Total	5.0	58.5	44.6	19.1	14.9	22.9	2.2	30.6
Post invoices to A/R files	34.4	0.0	2.9	0.5	3.0	21.8	15.5	0.0
Print A/R distribution report in detail	6.1	21.5	0.8	0.9	0.1	0.7	2.1	3.9
Grand total	45.5	79.9	48.0	20.5	18.0	45.3	19.7	34.7

### Check Preparation and Detail Posting

Elapsed Time (minutes and decimal minutes)



The Check Preparation and Detail Posting test selected all vouchers of 30 vendors for payment. Each vendor had from four to nine vouchers among the 18,000 A/P detail items. The check selection process was not timed because each package performs it quite differently. We recorded the time each program took to print the checks, print the A/P distribution in summary and detail, and post the distribution file to the G/L. SBT does not post in detail.

If you like to hold onto your money up to the last minute, Data Pro is the package of choice. Its efficiency when writing to files is always admirable, but here it really shines.

### Individual Tasks in the Check Preparation and Detail Posting Test

(Times given in minutes and decimal minutes)

	Solomon III	SBT Database Accounting Library	RealWorld Accounting System	Macola	AccPac Plus	Platinum Series	Great Plains Accounting Series	Data Pro Accounting Series
Print checks to spool file	4.0	22.7	7.9	3.5	0.3	0.3	0.9	1.0
Post checks in detail to A/P	0.0	N/A	8.1	2.1	0.0	1.8	0.0	0.0
Post A/P distribution to G/L	0.6	0.1	3.6	0.0	3.8	0.7	0.0	0.3
Post G/L journal to ledger	0.0	0.0	0.2	0.0	0.0	0.8	0.0	0.0
Post G/L transactions	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
Create G/L interface	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0
Post checks and post distribution summary	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
Print A/P distribution report in detail	0.1	3.5	0.1	0.2	0.1	0.2	0.0	0.2
Print A/P distribution report in summary	0.0	0.1	0.1	0.4	0.0	0.2	0.0	0.1
Post to A/P	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Total	4.7	26.5	20.1	6.5	4.9	4.7	2.4	1.6

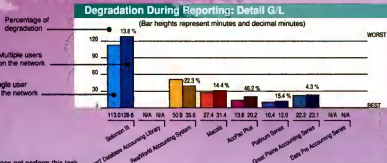
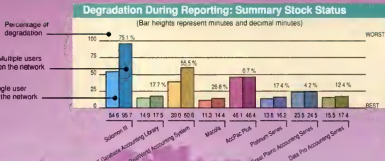
N/A—Not applicable: the product does not perform this task.



## PERFORMANCE TESTS: ACCOUNTING SOFTWARE ON A LAN

The Degradation During Reporting test had the software print the five reports from the Concurrent Printing of Reports test, first as a single active user and then with all five workstations processing at once. Results of running the 20,000-item inventory stock status report and the 47,500-item G/L year-to-date trial balance report are shown.

Data Pro had over 27,000 detail items in its G/L, enough for the stock status report but not enough for the detailed G/L report. Since SBT's G/L didn't have the detail items, the stock status report did not face much contention, and fast times were recorded (note, however, that the program could not produce the detail report). Great Plains' consistent performance was impressive; its degradation on both these and other reports was just a little over 4 percent. And one anomaly: RealWorld was the only package that actually improved under stress.



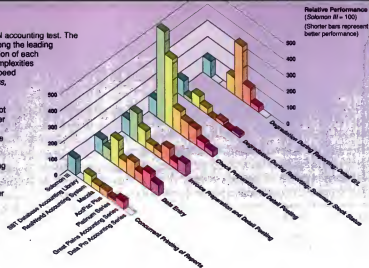
N/A=Not applicable; the product does not perform this task.



## ACCOUNTING SOFTWARE PERFORMANCE TESTS: COMPOSITE VIEW

No one package dominates every LAN accounting test. The results show dramatic differences among the leading packages, differences that are a function of each program's unique approach to the complexities of multiuser accounting. The overall speed champion is Platinum, but AccPac Plus, Great Plains, and Macola all have individual moments of performance excellence. Data Pro and SBT were not equipped to handle the heavy multiuser loads of some of the tests, but in the newest versions of these packages the vendors have taken steps toward correcting the capacity problem.

In looking at the Degradation During Reporting test for a detail General Ledger, remember that RealWorld actually improved its speed when other workstations were active on the network. Thus, its degradation score was a negative number (-22.3 percent), which does not show up on the composite view.



LAN APPLICATION SOFTWARE  
ACCOUNTING SOFTWARE

weighted average, and standard costing. If you use standard costing, purchase price variances can be posted when entering the voucher in A/P standalone or when entering the purchase order in the Purchasing module. Inventory item types can include labor, overhead, raw materials, work in progress, and finished goods.

Serial or lot numbers can be specified for inventory items and tracked through A/R, Purchasing, and A/P. Multiple inventory locations and location-to-location transfers can be performed.

#### OTHER MODULES

The Purchasing module's labor-saving devices allow the program to pay for itself quickly. When you print the suggested purchase order report in the inventory module, purchase orders are automatically generated for items in their restock range. These purchase orders may then be deleted or edited as you make stocking decisions.

The Bank Book, integrated with A/P, A/R, and Payroll, functions as a means to record all non-A/R cash receipts (for example, state tax refunds or insurance refunds) and non-A/P cash disbursements (such as bank charges). After you enter the

outstanding checks and deposits in transit, a bank reconciliation is prepared, and all applicable transactions are posted directly to the G/L.

#### CUSTOMIZATION AND SUPPORT

Source code is not available for customization, but an open architecture allows *Platinum* to be interfaced or directly integrated with a number of other packages. While the availability of all data files for direct integration allows great flexibility, it also presents a potential risk. You should expect to exercise manual controls to limit users' access to master files.

Unfortunately, Advanced Business Microsystems does not offer technical support for the product. You'll have to rely on consultants and other third-party organizations. This is disappointing, because a strong technical support department with access to the software development team could help increase your understanding of *Platinum's* rich features—not to mention the fact that the company would gain meaningful feedback.

*Platinum* is a package with many

strengths. Its speed, ease and flexibility of custom reporting, volume capacity, and depth of features in all its modules make it a premier multiuser accounting package that should meet almost any accounting or management requirement. Give this product strong consideration when it comes to selecting your automated multiuser accounting system.

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by Raymond August, Peggy Joscher, and Tom White

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tuser environment, and strong third-party support for special vertical-market modules, combined with the availability of the Ryan McFarland COBOL source code, add to *RealWorld's* appeal.

#### OVERALL SYSTEM FEATURES

*RealWorld* is able to process over 1,000 companies, but its automated installation feature is geared only toward the setup of a single company. We encountered some difficulties defining multiple companies, since the instructions referred us back and forth between two different manuals and had us operating programs outside of the menu system to set up subdirectories, cre-

feature is useful in an environment where a low number of master file records exists and a high volume of alterations occurs. In addition, file and record locks will not disturb your processing; you could inquire about or change an inventory quantity while at the same time someone is changing the description on that same unit inventory item. With record locking on, an inventory item that is being queried will prevent a stock status report from being printed, while field locking will allow printing of the report.

All of these features come at a price, however. In our benchmark tests, *RealWorld* was among the slower performers in both the reporting and data entry tests. We could not determine if this sluggish performance was due to the COBOL compiler or the inefficiency of the application source code itself.

#### NAVIGATION AND BACKTRACKING

*RealWorld* supports two methods of menu access: single-screen multilevel menus and pull-down menus. The pull-down-menu screen-marking feature lets you access a second application while performing another function. For example, you can go into G/L and add an account number while entering A/P vouchers, then come right back to where you left off in the A/P voucher screen.

Using the Access Manager, you can quickly navigate through different screens, define groupings of menu selections from different modules for a custom menu, and designate hotkeys to help you access selected menu options quickly. However, editing data and master records can be tedious because the system does not allow for free movement from field to field on a screen, nor does it have the ability to open a window and browse through master records during data entry.

Overall you will find an excellent audit trail. Each report is printed with the date and time and is assigned a unique number. In addition, unique reference numbers are assigned to transactions and journals. Reports may be sent to printer, disk file, or screen. Particularly impressive is the menu option for printing previously output reports to a disk file. This screen displays a report's description, creation date and time, users' initials, and previous printing dates. Multiple copies can be printed, and reports deleted, at your discretion, with no need to go through DOS.

REALWORLD ACCOUNTING SYSTEM					
Suitability To Task					
	0	1	2	3	4
General Accounting (GAAP)					✓
Financial Accounting				✓	
Enterprise Management Reporting				✓	
Decision Support				✓	

ate paths for program files, and initialize data files. Once a company is set up, selecting and loading one of the predefined data files can get you up and running fairly quickly. These files contain a chart of accounts, financial statement layouts, payroll tax tables, and default setup information for five different types of businesses.

*RealWorld's* password security features strong controls: it not only restricts access to the system to authorized users but also can restrict access to certain companies, modules, or functions within a module. Another excellent control feature is the ability to print reports listing changes made to master record items (charts of accounts, vendors, customers, and others) by date and user. This option allows you to track the master file changes that are made and find out who made them.

When processing on a LAN, *RealWorld's* field locking puts it in a class by itself. Field locking allows two users to call up the same master file record, such as an A/R vendor, on two workstations and make changes to two different fields. This

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RealWorld Accounting System's advanced "pop-down" Access Manager menu system displays the path of menus selected for the current option, allowing you to customize menus, perform screenmarking, and create a short menu.

#### GENERAL LEDGER

Companies who have found the account number lengths of other accounting systems limiting should be pleased with Version 5.0's significantly enhanced account structure. You can define a master account with up to eight digits and also maintain eight-digit subaccounts or profit centers.

One unusual feature is that you are required to copy valid G/L accounts into the subsidiary modules. Although this is not time consuming, it is a tedious maintenance task that requires you to remember to perform this procedure every time an account is added; otherwise it would not be considered a valid account in a subsidiary module. On the other hand, this feature allows you to limit the accounts to which each module has access. For example, you can keep the A/P clerk from having access to the retained earnings account.

Up to 13 accounting periods can be defined, a feature that should be useful to businesses with 4-4-5-week reporting requirements. Since the system is date sensitive, transactions for prior and subsequent periods can be entered, a plus for companies that have been unable to close and process the current year's data while waiting for year-end adjustments. Detail entries for a full year can be maintained in the G/L and may be compressed if disk storage space or computing performance becomes a problem.

The G/L prepares recurring journal entries of fixed or variable dollar amounts. Unfortunately, recurring entries are not date or period triggered but must be manually selected for posting. The manner in which RealWorld displays its journal en-

tries is a bit unorthodox: only one entry line item at a time (debit or credit) is shown on-screen.

Reports that can be generated include a detail or summary trial balance and G/L for all accounts or for a selected range of accounts. With the powerful G/L report writer, customized balance sheets, income statements, and cash flow statements with supporting schedules can be created with comparisons to budget or prior-year data. Also included is a text facility for creating footnotes, opinions, and header information. The source cross-reference report is helpful for reconciling information from other modules, such as A/P. This report prints transactions by source or journal number and can be used to reconstruct a misplaced printout.

#### ACCOUNTS PAYABLE

Although RealWorld's A/P can be operated as a standalone module, it can also be integrated with the G/L, Purchase Order, Job Costing, and Check Reconciliation modules. The system permits four user-defined aging periods. Distribution is possible to only one G/L cash and A/P account.

The system processes information on regular vouchers, cancellations, manual checks, account distribution adjustments, and retainages due. Vouchers may have unlimited account distributions, but only the last three entries are displayed on-screen. The system lacks the ability to enter quantities and unit costs and then calculate the extension for each distribution. Recurring items may be processed for fixed or variable dollar amounts, but distributions are restricted to three accounts.

You will find processing payments to be straightforward, except when it comes to voiding a check. To do this, you must set up a G/L suspense account, enter and post a negative manual check (non-A/P check voucher), and reenter the original voucher. It would be easier if the system automatically reinstated the voucher.

Standard reports include an aged report of open items in summary or detail, a vendor history, a comparative purchases/discount report by vendor, and a listing of payables' related cash needs as of a user-specified date. A check reconciliation function is part of a separate Check Reconciliation module.

#### ACCOUNTS RECEIVABLE

A/R can be operated as a standalone system or can be integrated with the G/L, Order Entry/Billing, Sales Analysis, Check Reconciliation, and Job Costing modules. Multiple sales accounts and three cash accounts are allowed, but only one A/R account can be used.

RealWorld's A/R module has some very flexible features. Not only can you set a minimum finance charge, but you can also define two levels with different annual rates for balances in excess of specified amounts.

Each customer may be designated as either open item or balance forward and may be associated with different user-defined statement cycles to simplify statement printing. You'll be able to define and maintain multiple multilevel sales tax tables. Salespersons may also be defined and commissions calculated and reported, although A/R allows only one flat commis-

**FACT FILE**

**RealWorld Accounting System, Version 5.0**  
RealWorld Corp., 282 Loudon Rd., P.O. Box 2051, Concord, NH 03302; (800) 678-6336, (603) 224-2200.  
List Price: \$795 per module (for most modules); System Kit, \$495 (prices for Unix and Xenix versions vary slightly).  
Requires: 640K RAM, Atky's 386 MultiWare, Novell's Advanced NetWare/285.2 or later, Novell's EL/51 or EL/52; DOS 3.3 or later.  
In Short: RealWorld is a moderately powerful package whose ability to be customized gives it a strong presence in several vertical markets. Its multitier performance lags behind that of much of the competition.

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LAN APPLICATION SOFTWARE  
ACCOUNTING SOFTWARE

sion percentage to be associated with a customer. (If you require a more sophisticated commission function, you will need *RealWorld's* O/E module.) Recurring items can be set up, subject to the same options and limitations as those in A/P.

If you decide to use the open-item method, cash receipts can be either manually or automatically applied to a customer's open invoices. You'll be able to distribute cash sales and print bank deposit slips to G/L revenue accounts through the cash receipts function. Payments can also be applied to a customer's account to cre-

**RealWorld's new menu  
system and field-  
locking features are  
very attractive.**

ate a credit balance.

In addition to customer statements, A/R will print sales and cash receipts journals, a commissions-due report, and a detail or summary aging report.

#### ORDER ENTRY AND INVENTORY

Used together, *RealWorld's* Order Entry and Inventory modules furnish plenty of power for small- to medium-sized wholesalers and distributors. The O/E system prepares invoices and picking tickets and is able to process drop shipments to customers. Availability checking is performed on inventory items, and back orders are created and tracked if an item is out of stock or available in insufficient quantities.

As orders are entered and subsequently shipped, inventory item records are automatically updated with the appropriate information. Credit memos can be prepared for merchandise returned from customers; the stock may be returned to the warehouse or written off as scrap if damaged. Up to 999 ship-to addresses, with associated sales tax codes that allow tax calculations based on the ship-to location, can be created for each customer.

The Inventory module handles multiple warehouse locations and four inventory valuation methods: LIFO, FIFO, average, and standard cost. If you opt for the standard costing method, the system is also ca-

pable of processing purchase price variances and posting them to the G/L.

In addition, the Inventory module maintains a very flexible eight-level pricing structure and a facility for making automatic price changes by either a dollar amount or a percentage. Pricing specials on individual items for a specified period of time can also be set up in the O/E module. Besides the 15-character inventory item code, O/E maintains a user-defined 5-character category code for reporting purposes.

Available reports include an inventory valuation, a stock status report, ABC analysis, a physical count worksheet, and purchasing advice. Most reports are capable of being selected and sorted by a range of options: item, warehouse, category, vendor, and location.

#### DOCUMENTATION AND SUPPORT

The fully indexed manuals are well written and concise; they contain an excellent glossary and examples helpful to a novice user. Context-sensitive help screens are available at the touch of a function key. Although the program comes without a tutorial, the G/L includes sample data that could be used for training. Including sample data in the other modules would strengthen this system.

Support is maintained primarily through *RealWorld's* network of dealers and value-added resellers. Phone support is available for \$175 per module for 6 months or \$30 per 15-minute phone call. In addition, *RealWorld* sells Payroll, Purchase Order, Job Cost, Sales Analysis, Check Reconciliation, Reportwriter and Data Bridge, and the Snow Software Report Writer modules. Professional Invoicing is a strong module that extends the functions available in Order Entry and A/R. Additional reports can be created with the Reportwriter, and data can be output to other applications, such as a spreadsheet, with the Data Bridge.

*RealWorld* is a solid, proven accounting system with many features that should appeal to small and medium-sized businesses anticipating growth. Its new menu system and field-locking feature in multiuser mode are very attractive. The customization possible due to source code availability and the extensive third-party offerings already in existence make *RealWorld* a cost-effective choice for companies with special accounting needs.

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## SBT Database Accounting Library

by Timothy Lee and Ed Kniel

*SBT Database Accounting Library*, Version 6.2, from SBT Corp., has clear advantages and disadvantages. On the positive side, it doesn't overwhelm you with complex options or extensive master files that contain more information than you want to maintain. On the negative side, many of its accounting functions are not as fully developed as those of other high-end packages. For example, if you use FIFO or LIFO for valuing your inventory, you will need to purchase a third-party add-in product or program the capability yourself. Most *SBT* modules are priced at \$595.

*SBT* is developed as full multiuser *dBASE* code, but it can be run in either single or multiuser mode. Versions of the source code are available for DOS; Macintosh and Unix/Xenix formats are included in the cost of the software. A compiled *FoxBASE* version is also available.

Source code that can move among a large number of environments has the advantage of letting you expand your platform as your needs demand and your resources allow. But since the code is written for a common denominator compatible with all these environments, it is optimized for no single one. To improve performance and make the most of your own environment's features, you'll probably want a knowledgeable programmer to han-

dle the complex customization process.

*SBT*'s open architecture lends itself to easy modification. Change control (making sure your changes don't have unintended consequences) is one key issue regarding easily modified packages. *SBT* Corp. is planning to release a new module that identifies processing changes that arise as a result of a program change. This will be a valuable quality-assurance tool to anyone modifying the code or involved with general *dBASE* code development.

Actual multiuser performance is as good as the environment you're running under. Our benchmark tests used compiled *FoxBASE* under *NetWare*. *SBT*'s performance is slow because the program builds a unique file for the working index each time an aging report is prepared. (*SBT* Corp. does not provide a custom Report Writer module; for that, you'll have to turn to Alpha Software Corp.'s *Alpha Four* or a similar product, or use the command mode of your database environment.)

Installing *SBT* is simple. For optimized performance in a larger network you can segregate key data files to different drives, thereby decreasing contention for them. All application modules have a consistent, well-designed default menu structure that presents options on-screen in four quadrants: daily processing options are in the upper left; file maintenance and utility options, lower left; reports and printing options, upper right; and period and year-end closing operations, lower right. Accessing data entry with one keystroke from a module's main menu saves input time and makes training easier.

### GENERAL LEDGER

*SBT*'s Ledger is a streamlined G/L module with real-time account updating and reporting. Typing "?" during data entry for the account number displays a convenient point-and-shoot look-up capability. Unfortunately, this feature was not supported for journal entries in the version we evaluated.

Ledger's default account structure is a fixed, five-digit prime account with an optional three-digit subaccount (99999-999) for tracking departments. Summary accounts are created to cover departmental information for up to nine subaccounts within a basic account group, such as fixed or current assets. This allows you to track subaccount detail in the G/L without displaying the detail accounts on the financial

statements. The department account type descriptions appear as subtotal descriptions on the financial statements, and they can be changed to meet special needs. Customized account types are also available for total lines on the financial statements.

Recurring journal entries to support items such as fixed rental or amortization expenses or straight-line depreciation can be entered once and posted daily or monthly. The usefulness of the recurring entries for utility payments or variable rent is limited because distribution accounts and amounts may not be changed.

### SBT DATABASE ACCOUNTING LIBRARY

#### Suitability To Task

	0	1	2	3	4
General Accounting (GAAP)				✓	
Financial Accounting			✓		
Enterprise Management Reporting				✓	
Decision Support				✓	


A ratio group may be defined for each account to prepare debt equity, current, and gross profit ratio analyses. In addition to actual balances, current- and prior-year budgets are maintained.

To improve data entry control, an optional batch total can be used on journal entries. Automatically reversing entries ease month-end accruals. Journal entries are not date-sensitive, however; they are automatically posted to the current period. A separate option posts to a prior period or prior year, and the auto-reverse function can be used to post to future periods.


Quick maintenance lets you add new accounts on the fly during journal entry. There are no forced reports prior to posting, although batch reports are available so that entries in the current batch can be edited before posting.

### ACCOUNTS PAYABLE

The A/P module, Payables, furnishes a vendor master record that includes the last payment date and amount, a credit limit, and a single default expense distribution account for each vendor. The year-to-date



**PC FACT FILE**



**SBT Database Accounting Library, Version 6.2**  
 SBT Corp., One Harbor Dr., Sausalito, CA 94965; (415) 331-9900.  
 List Price: Most modules, \$595; Multi-Net (for unlimited users), \$595.  
 Requires: 640K RAM; Banyan's VINES, IBM's PC LAN, Novell's ELS NetWare II or later, Xenix, 3Com's 3+ Share; DOS 3.1 or later.  
 In Short: Built on the *dBASE* language, *SBT* is extremely easy to modify and therefore has become a popular engine for hundreds of vertical packages. Also notable is its focus on providing real-time management information. Its multiuser functionality is limited, however, and its performance on a LAN is sluggish.

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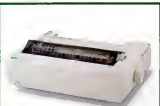
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## Personics ... NCP

3126 □ **SeeMORE 2.0** ... 54.

4328 □ **Look & Link 1.04** ... 59.

4384 □ **Ultravision 1.2** ... 79.

3124 □ **DATABASE 1.22** ... 119.

## Peter Norton ... NCP

3152 □ **Norton Commander 2.0** ... 52.

3146 □ **Advanced Utilities 4.5** ... 89.

3153 □ **Norton Editor 1.3** ... 45.

4150 □ **Dan Bricklin's Demo Prog. 2.1.0** ... 109.

## Quarterdeck ... NCP

3221 □ **Expanded Memory Mgr. 386 4.2** ... 39.

3220 □ **DESQView 2.24** ... 79.

4586 □ **DESQView 386 1.0** ... 115.

## Reference Software ... NCP

4396 □ **Grammatik III 1.1** ... 52.

## Revolution Software ... NCP

4480 □ **VGA Dimmer 2.01** (screen saver) ... 19.

3254 □ **Cruise Control 3.02** ... 39.

## Rightsoft ... NCP

4155 □ **Rightwriter 3.1** ... 54.

## Samna ... NCP

5148 □ **Am! 1.0A** ... 129.

## Simon & Schuster ... NCP

3314 □ **Typing Tutor IV 1.0** ... 33.

## Softlogic Solutions ... NCP

3546 □ **Disk Optimizer 4.01** ... 45.

3542 □ **Software Carousel 3.0** ... 49.



## Personics ... NCP

□ **SeeMORE 2.0** for 4-2-3—New version! The powerful add-in for 4-2-3 just got better. See more rows and columns, create multiple windows, display live graphs, and more ... \$54.

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## Software Publishing ... NCP

3495 □ **Professional Plan 1.02** ... \$59.

3499 □ **PFS:First Publisher 2.1** ... 79.

4342 □ **PFS:First Graphics 1.0** ... 89.

3476 □ **PFS:First Choice 3.01** ... 99.

3496 □ **Professional Write 2.1** ... 139.

3493 □ **Professional File 2.0** ... 189.

4527 □ **Office Writer 6.1** ... 299.

3482 □ **Harvard Graphics 2.12** ... 299.

4669 □ **Harvard Graphics Access. Pk 1.0** ... 299.

4284 □ **Harvard Project Manager 3.0** ... 439.

## Spinnaker ... NCP

4441 □ **Resume Kit 1.29** ... 25.

4446 □ **8-in-1 1.15** ... 39.

4444 □ **Splash 1.0** ... 59.

## Springboard ... NCP

3534 □ **Newsroom Pro 1.0** ... 45.



## Epson ... 1 year

**LQ-510 Printer**—New! Including SmartPark paper handling and 360 x 360 graphics printing resolution, the LQ-510 gives you features found in high-end 24 pin printers at a very affordable price ... \$349.

## Symantec ... NCP

4732 □ **SOZ!Plus 1.11** ... 65.

3427 □ **EQ & A Write 1.01** ... 129.

3412 □ **Grandview 1.0** ... 189.

3425 □ **O & A 3.0** ... 219.

3431 □ **Breakthrough Timeline 3.0** ... 369.

## T/Maker ... NCP

4179 □ **ClickArt Business Images** ... 45.

4185 □ **Scrapbook + 1.0** ... 85.

## TOPS ... NCP

3724 □ **NetPrint 2.0** (share printers) ... 119.

3726 □ **TOPS 2.1** ... 119.

3725 □ **TOPS Repeater** (extends network) ... 129.

3720 □ **Fleshcard 2.1** (AppleTalk network card; 1 year warranty) ... 169.

## Traveling Software ... NCP

4190 □ **Battery Watch 1.0** (3 1/2" only) ... 27.

3729 □ **LapLink Mac 2.0** (Mac-PC transfer) ... 79.

5179 □ **LapLink III** ... 85.

4891 □ **ViewLink 1.0** ... 95.

3727 □ **DeskLink 2.21** ... 99.

## True BASIC, Inc. ... NCP

3561 □ **True BASIC 2.1** ... 52.

## Vericomp ... NCP

3765 □ **SoftBytes 2.0** ... 35.

## White Crane Systems ... NCP

5504 □ **Brooklyn Bridge 2.0** (3 1/2" only) ... 72.

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## Microsoft ... NCP

QuickPascal 1.0—Makes programming in Pascal easier. Object Oriented Programming and the hypertext-based Quick Advisor help to keep everything easy and intuitive. Source compatible with Turbo Pascal ..... \$69.

## WordPerfect Corp. ... NCP

3799	WordPerfect Library 2.0	69.
3798	WordPerfect Executive 1.0	129.
3804	WordPerfect 5.0	239.
3805	WordPerfect Network 5.0	349.
3806	Additional Network Stations 5.0	84.
<b>WordStar USA ... NCP</b>		
2825	WordStar Prof. Release 5.5	209.
5000	Upgrade to Release 5.5	89.
<b>Wordtech ... NCP</b>		
3810	QDBXL 1.3	145.
<b>Xerox ... NCP</b>		
4539	Professional Extensions 1.0	399.
3812	Venture Publisher 2.0	call
<b>XTREE Co. ... NCP</b>		
4512	XTREE Pro 1.1	69.
<b>XYQUEST ... NCP</b>		
4393	XyWrite III Plus 3.55	229.

## RECREATIONAL/EDUCATIONAL

### Broderbund ... CP

1413	Where in the World is Carmen Santiago?	25.
1414	Where in the USA is Carmen Santiago?	25.
1417	Where in Europe is Carmen Santiago?	29.
4948	JetFighter (by Velocity)	35.
<b>Electronic Arts ... CP</b>		
5180	Dinosaur Discovery Kit (First Byte)	29.
1858	Earl Weaver Baseball 1.5	32.
5181	Hillstar (from SS)	32.
5124	6888 Attack Sub	35.
<b>Microprose ... CP</b>		
4454	F-19 Stealth Fighter	39.
2725	F-15 Strike Eagle	22.
<b>Microsoft ... NCP</b>		
2858	Flight Simulator 3.0	35.
<b>Mindscape ... CP</b>		
4897	Gauntlet	29.
2752	Balance of Power 1990	33.
<b>Parlor Software ... CP</b>		
3159	Bridge Parlor 2.3	49.

## Sierra On-Line ... CP

4752	Gold Rush	\$25.
4455	Leisure Suit Larry II	33.
4345	King's Quest IV (512k version)	33.
4399	Manhunter	33.
4456	Police Quest II	33.
3404	Space Quest III	33.
<b>Spectrum Holobyte ... NCP</b>		
3467	Tetris (addicting mind teaser)	24.
4283	Falcon AT (F-16 simulation)	32.
5187	IVETTE!	32.
<b>Stone &amp; Assoc. ... NCP</b>		
3436	Memory Master (ages 2-6)	22.
3435	My Letters, Numbers, Words (2-6)	22.
5231	Phonics Plus	22.
3439	2nd Math (ages 7-16)	27.
<b>Sublogic ... NCP</b>		
4653	Up Penscope	25.
3335	Ujet (requires CGA or EGA)	33.
<b>True BASIC, Inc. ... NCP</b>		
	Kernery/Kurtz Math Series each module	29.



## Software Publishing ... NCP

Harvard Graphics—Presentation graphics with smooth integration of text, charts, graphics, and high quality output. Now with FREE video to get you enjoying Harvard Graphics sooner ..... \$299.

## HARDWARE

Manufacturer's standard limited warranty period for items shown is listed after each company name. Some products in their line may have different warranty periods.

### AST Research ... 2 years

1223	IO Mini 2 C/S/P	89.
1302	SixPak Plus 64k C/S/P	129.
4107	RAMpage Plus 286 512k	419.
4105	RAMpage Plus MicroChannel 512k	469.
<b>Compucable ... 2 years</b>		
1604	2-Position switch box	25.
1605	3-Position switch box	35.
<b>Cuesta ... 1 year</b>		
1608	Datasaver 400 Watt (standby power backup)	429.
<b>Curtis ... lifetime</b>		
1681	Curtis Clip CC-1	6.

1686	Disk Holder DB-1	\$8.
1718	3 1/2" Disk Holder DB-2	8.
1704	Printer Stand PS-1	18.
1713	Filtered SaleStrip SPF-3	24.
1678	Universal System Stand SS-3	25.
1694	Emerald SP-2	36.
1707	Ruby SPF-2 (6 outlets; EMU/RFI filtered, 6 ft cord)	55.
1708	Ruby-Plus SPF-2 Plus (w/FAX & modem protection)	65.
<b>DacEasy ... 1 year</b>		
3211	Breakthru 286-8 (8 MHz accelerator)	289.
3210	Breakthru 286-12 (12 MHz accelerator)	379.
<b>Epson ... 1 year</b>		
We are an authorized Epson Service Center.		
1906	FX-850 (80 col., 264 cps, 9 pin)	call
1904	FX-1050 (136 col., 264 cps, 9 pin)	call
5183	LQ-510 (80 col., 180 cps, 24 pin)	349.
1830	LQ-850 (80 col., 264 cps, 24 pin)	call
4117	LQ-950 (110 col., 220 cps, 24 pin)	call
1917	LQ-1050 (136 col., 264 cps, 24 pin)	call
4116	LQ-2550 (136 col., 333 cps, 24 pin)	call
5184	LX-810 (80 col., 180 cps, 9 pin)	199.
1052	Printer-to-IBM cable (6 feet)	15.
We carry a full line of Epson accessories and ribbons. Call us with your needs.		
<b>5th Generation ... 1 year</b>		
3952	Logical Connection 512k	529.
4921	Logical Connection 1 Meg	749.
<b>Hayes ... 2 years</b>		
4763	Personal Modern 1200 (with Smartcom EZ, 2 year warranty)	145.
2304	Smartmodem 1200	289.
2305	Smartmodem 1200B (w/Smartcom II)	289.
2306	Smartmodem 1200B (hardware only)	259.
2307	Smartmodem 2400	429.
2308	Smartmodem 2400B (w/Smartcom II)	429.
2309	Smartmodem 2400B (hardware only)	399.
<b>Hercules ... 2 years</b>		
2318	Graphics Card Plus	189.
5120	VGA Card	189.



## Epson ... 1 year

FX-1050 Printer—Feature laden 136 column, 9 pin dot-matrix printer. SmartPark mode loads single sheets without removing continuous form paper. Prints 264 cps draft and 54 cps letter quality (12 cpi mode) ..... call

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<b>Intel ... 5 years</b>	
4696	2400B Internal Modem ... \$159.
2352	2400B Internal Modem 2 (for PS/2) 249.
5119	2400 Baud External Modem ... 179.
2346	Inboard 386/PC w/1 Meg ... 599.
4646	Inboard 386/PC Piggyback 4 Meg 1249.
2339	Inboard 386/AT (req. inst. kit) ... 859.
4266	Above Board Plus 512k ... 419.
4267	Above Board Plus I/O 512k ... 449.
5336	Above Board Plus 8.2 Meg ... 869.
5342	Above Board Plus 8 I/O 2 Meg ... 899.
4272	Above Board 2 Plus 512k ... 469.
4339	Above Board Plus Piggyback w/2 Meg (upgrades to 6 Meg) ... call
4275	Connection Coprocessor ... 769.
4857	Visual Edge (improve the output of your HP Laserjet II) ... 449.
<b>MATH COPROCESSORS</b>	
2375	8087 (for IBM-PC & XT) ... 89.
2374	8087-2 (for 8 MHz 8088 CPU's) ... 129.
2368	80287 (for 6 MHz 80286 CPU's) ... 135.
2370	80287-8 (for 8 MHz 80286 CPU's) ... 199.
2369	80287-10 (for PS/2 Models 50 & 60) 229.



## Intel ... 5 years

The Intel family of 2400 bps modems provide reliable communications at a great price.

2400EX (external) ...	\$179.
2400B Classic (internal) ...	159.
2400B Model 2 (internal Microchannel) ...	249.

5151	New HiREZ Mouse (C9) ... 89.
5152	Mouse w/Paint Show (C9) ... 99.
4297	ScanMan (hand held scanner) ... 185.
<b>Magnavox ... 2 years</b>	
5051	VGA Adapter (BAV810) ... 259.
4758	13" CGA Monitor (8CM515) ... 269.
4760	13" Hi-Res Monitor (8CM053) ... 369.
4761	13" VGA Monitor (8CM062) ... 389.
4762	13" VGA Monitor (8CM082) ... 449.

## Microsoft ... lifetime

2870	Match 20 (1 yr. wrty., includes free PCTV installation video) ... 349.
2886	Match 20 Disk Plus Option (floppy controller) ... 69.
2887	Match 20 Memory Plus Option (512k upgradeable to 3.5 Meg) ... 339.
2897	Mouse with Paintbrush ... 109.
2896	Mouse with Easy CAD ... 125.
2898	Mouse with Windows 286 2.1 ... 139.
<b>Mouse Systems ... lifetime</b>	
2812	OmniMouse (serial only; 1 year wrty) 39.
4306	PC Mouse II w/PC Paint+ ... 89.
4350	PC Mouse II w/Autosketch ... 105.

## NEC ... 2 years

4799	Multisync 2A (VGA Monitor) ... 499.
5085	Multisync 3-D Monitor ... 699.
<b>Orchid Technologies ... 4 years</b>	
3069	Tiny Turbo 286 (accelerator board) 219.
4765	Designer 800 VGA (360 x 480) ... 249.
4690	ProDesigner VGA (800 x 600) ... 310.

## Pacific Rim ... 1 year

5010	1.2 Meg External (for PS/2's) ... 215.
5011	360k External 5 1/4" Drive ... 179.
<b>PC Power &amp; Cooling Sys. ... 1 yr</b>	
<b>REPLACEMENT POWER SUPPLIES</b>	
3202	Turbo Cool 150 (25° - 40° cooler) 129.

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3205	Turbo Cool 250 (25° - 30° cooler) \$169.
3200	Silencer 150 (84% noise reduction) 115.
3201	Silencer 200 (69% noise reduction) 149.
4514	Turbo Cool 375 ... 299.

## Practical Peripherals ... 5 years

3101	1200 Baud Internal Modem ... 69.
3100	1200 Baud External Modem (min) 77.
4149	PiLink (extends par. print signal) ... 109.
3097	Microbuffer Inline (par. print buffer/32k) ... 135.
3103	2400 Baud Internal Modem ... 139.
3102	2400 Baud External Modem ... 179.
5285	2400 Baud External MNP Modem (Level 5) ... 209.
4542	2400 Baud Internal Modem for PS/2 ... 229.

## Princeton Graphics ... 1 year

3166	Ultrasync (800 x 600 max. res.) ... 549.
<b>Quadram ... 1 year</b>	
5143	JT-FAX 9600 ... 549.

## Safe Power Systems ... 2 years

4561	Safe 250W (standby power bkup) 249.
4562	Safe 425W (standby power bkup) 369.
4563	Safe 500W (standby power bkup) 495.

## SCOT Technology ... 2 years

5107	Floppy Drive Controller (S/P) ... 99.
5109	SCOT VGA/16 (with 256k) ... 299.
5111	SCOT 286-12 (12 MHz accelerator) 299.
5402	SCOT 386-16 (16 MHz accelerator) 419.

## Targus ... lifetime

4899	Nylon Laptop carrying case ... 55.
4901	Leather Laptop carrying case ... 139.

## TheComplete PC ... 2 years

4889	TheComplete Hand Scanner 400 ... 159.
4885	TheComplete Answering Machine 219.
4887	TheComplete FAX 9600 ... 429.
5140	TheComplete Page Scanner ... 549.

## Toshiba ... 1 year

3684	T1000 Laptop (80C88, 6.4 lbs.) ... call
3681	T1000 768k Memory Card ... 269.
4656	T3100E Laptop (80286, 12 MHz, 20 Meg) ... 2795.
4958	T1600 Laptop (80C286, 12 MHz, 20 Meg) ... 3295.



## Epson ... 1 year

**FX-850 Printer**—High speed, 80 column, 9 pin dot-matrix printer. Handles big printing jobs with ease and efficiency. Prints 264 cps and 54 cps near letter quality (12 cpi mode) . call

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## Video 7 ... 5 years

3776	VEGA Deluxe (supports 640x480)	\$219.
3778	VEGA VGA	275.
4193	FastWrite VGA (includes 256k)	319.
4194	VRAM VGA (includes 256k)	469.

## DRIVES

### IOmega ... 1 year

2485	Bernoulli II Single 20 Meg Internal	767.
5116	Bernoulli II Single 44 Meg Internal	995.
2486	Bernoulli II Dual 20 Meg External	1659.
4278	20 Meg Cartridge Tripak (5 1/4")	169.
5113	44 Meg Cartridge Tripak (5 1/4")	249.

### CONTROLLERS (required)

2499	PC2 Card	169.
2500	PC2B Card (bootable card for PCXT/AT)	229.
2502	PC4 Card (for PS/2 Model 50/60/70/80)	299.

### Mountain Computer ... 1 year

2917	40 Meg Internal Tape Drive	379.
2915	40 Meg External Tape Drive	479.
2916	40 Meg External Tape Drive with Power Supply	569.
5499	80 Meg Internal Tape Drive	519.
5503	80 Meg External Tape Drive	629.
5190	40 Meg Data Cartridges (pre-formatted)	35.

### Plus Development ... 2 years

3105	Hardcard 20 Meg (49 ms)	549.
3106	Hardcard 40 Meg (28 ms)	699.
5164	Impulse 40 Meg Int. Drive (12 ms)	659.
5165	Impulse 80 Meg Int. Drive (12 ms)	879.
5163	Impulse Controller (required)	229.

### Seagate ... 1 year

FREE PCTV® Hard Drive Installation Tape with purchase of 20, 30 or 40 Meg Seagate drive for the IBM PC (not for AT), Beta or VHS.

2285	20 Meg Internal Hard Drive ST225 (w/controller and cables, 65 ms)	299.
2286	30 Meg Internal Hard Drive ST238 (w/controller and cables, 65 ms)	319.

4554	40 Meg Int. HD ST251-1 (28 ms)	\$379
4624	80 Meg Int. HD ST4096 (28 ms)	619

### TEAC ... 1 year

4950	PC, XT 360k Drive (5 1/4")	79.
4951	720k Drive (specify XT or AT, 3 1/2")	79.
4670	1.44 Meg Drive for AT (3 1/2")	99.
4326	1.44 Meg Drive for AT (includes Bastech software utilities, 3 1/2" copy prot.)	119.

### Toshiba ... 1 year

3650	AT 360k Drive (5 1/4")	85.
3649	AT 1.2 Meg Drive (5 1/4")	99.
4755	AT 1.44 Meg Drive (3 1/2", includes Bastech software utilities)	119.

## MISCELLANEOUS

### CompuServe

1676	CompuServe Information Service	24.
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### Cables ... lifetime

1019	Smartmodem-to-AT cable (9 feet)	15.
1050	Parallel Printer cable (15 feet)	19.



### Mountain Computer ... 1 year

The Mountain TD8000 80 Mb Tape Drive—Provides 80M of storage on a single tape cartridge. Backup and restore up to 2Mb per minute, or 4.4Mb per minute using the optional Mach2 controller card. call

## DISKS

All disks have a lifetime warranty.

### 5 1/4" DS/DD Disks (360k)

3291	Sony (10 disks per box)	12.
2789	Maxell MD2-D (10 disks per box)	13.
4192	Verbatim Datalife (10 disks per box)	13.

### 5 1/4" DS/High Density Disks (1.2 Meg)

3770	Verbatim Datalife (10 disks per box)	22.
3292	Sony (10 disks per box)	23.
2790	Maxell MD2-HD (10 disks per box)	23.

### 3 1/2" DS/DD Diskettes (720k)

3297	Sony (10 disks per box)	16.
3772	Verbatim (10 disks per box)	16.
2792	Maxell (10 disks per box)	17.

### 3 1/2" DS/High-Density Diskettes (1.44 Meg)

3298	Sony (10 disks per box)	39.
3773	Verbatim (10 disks per box)	39.
2793	Maxell (10 disks per box)	39.



### Epson ... 1 year

LQ-2550 Printer—A full featured 24 pin, 136 column printer. Includes 7 built-in fonts, push tractor, and advanced paper handling, 333 cps draft, 111 cps LQ (12 cpi mode). call

## MEMORY

3248	256k DRAMs (120 nanosecond)	call
3241	256k x 9 SIMMs (100 nanosecond)	call
4366	1 Meg x 9 SIMMs (100 nanosecond)	call
5510	1 Meg x 9 SIMMs (80 nanosecond)	call
4705	1 Meg Chips (100 nanosecond)	call

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- For monitors, printers, Bernoulli Boxes, computers, hard drives, and power backups, actual UPS shipping. Call for UPS 2nd Day & Next Day Air.
- For all other items, add \$3 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd Day Air at no extra charge if you are more than 2 days from us by UPS ground.
- Hawaii:**
- For monitors, printers, Bernoulli Boxes, computers, hard drives, and power backups, actual UPS Blue charge will be added. For all other items, add \$3 per order.
- Alaska and outside Continental US:**
- Call 603/446-3383 for information.



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Exactly twenty summers ago, thousands of two-legged creatures of the so-called "hippie" persuasion converged on a farm near Woodstock, NY (pop. 8,000) for three days of peace, love, and rock and roll. In a similar vein, a few four-legged creatures of the "furrie" persuasion converge every year on Marlow, NH (pop. 559) for their own festival of freedom. For while it's true that most survivors of the 60's have chained their unbridled spirits to conventional 9-5 jobs, our eternally-hip, and decidedly long-haired mascots continue dancing to the beat of a very different drummer.

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by our neighbor Fritz Wetherbee, noted National Public Radio correspondent on New England oddities. It's free with any order of \$500 or more between now and September 30.

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# LAN APPLICATION SOFTWARE ACCOUNTING SOFTWARE

fields for 1099 payments, purchases, and other items can only be accessed when you are entering a new vendor—an inconvenience when converting from your current system.

On-line Inquiries displays a 24-month vendor history, status, open payables, checks, purchase orders, and purchase receipts when linked to the purchasing and inventory module. You will like the vendor notes file, which allows unlimited "Post-it" notes for assistance in evaluating vendor performance and in providing activity history when you are training new clerks and managers.

vendor. Only batch summaries can be posted to the G/L; individual item detail is maintained in the payables journals only.

You can define the length or date cut-off for four aging periods to prepare your A/P aging report. You can analyze the detail behind the on-line business status report (which shows open orders and period-to-date order activity, current receivable balance, and period-to-date billings, receipts, and cost of goods sold) by using the simple option grids for reporting on the check and invoice registers. And the se-

ling the O/E screen; a pop-up window for item inquiry is supported.

When you enter the quantity and unit cost of receipts, the purchase order costs are changed to reflect actual costs. If the order is received in full at the original cost, setting the cost prompt to "no" will speed the data entry process. But use this feature with care, as any change in the unit cost will require manual correction.

Upon receipt of goods, the payable entry is established to book the liability. Since invoices frequently lag behind the shipment, a manual A/P correction would be needed if the actual cost were different from the purchase order cost. It would be nice if the system provided automatic adjustments upon entry of the invoice to Payables.

The report grid allows you to sort the purchase order status report by order number, vendor, item, request date, requisition, and department number. A recurring purchase order report is provided, as are reports on receipts and back orders.

## ORDER ENTRY

Orders is a sales order module that integrates with Ledger and Invoice/Statement to allow you to create bids, orders, and back orders for out-of-stock items. It performs sales discount calculations and can print UPS COD tags with the dollar amount shipped (including shipping charges), the full order amount, or just the open amount. Invoice/Statement has the inventory module built in and provides an open-item billing process to manage your customer orders. (Professional is a separate module that supports balance forward accounts and is designed for professional service firms.)

SBT maintains a credit limit and current A/R balance that is updated when the shipment of goods and related charges are recorded. Unless you update your information in a timely manner, there is a danger that you may send goods to a customer who has exceeded his credit limit.

Recurring Billings can be used for periodic billing of service contracts or other items. The aging periods are user defined, so if you age from the tenth of the month, the system will handle it. A unique feature is the ability to look up customers based on their phone numbers.

Management decisions are supported by the budget recap report and a ratio analysis report that calculates 21 key financial ratios for asset and debt management, liquidity, and profitability.

15/03/91	Orders History	SBT	
Printin Products, Incorporated			
Business Status Report 4 of 4 15/03/91			
divisions/statements		divisions	
Current Balance:	116532.63	Current Balance:	56132.21
PT Billings:	25766.85	PT Payables:	23658.44
PT Receipts:	53462.23	PT Payments:	25709.44
PT Discounts:	146.32	PT Billing/Adj:	624.30
PT Gross:	24757.44	Approved to Pay:	1205.25
Inventory Value:	101900.32	Approved Billing/Adj:	76.33
divisions		divisions	
Open Orders:	85226.26	Open P/O:	42702.38
PT Orders:	27166.87	PT Orders:	45425.38
PT Shipments:	55635.32	PT Receipts:	36611.69
PT Gross Receipts:	32362.55	Net Cash Percent:	2769.76
Order Choice (Percent/Recalculate/Print/Quit) ==> 			

## SBT Database

Accounting Library's On-line Business Status Report exemplifies the program's emphasis on presenting real-time information to be used for executive business management. It helps you to focus on three things: cash, customers, and inventory.

Defaults for terms, payment priorities, and expense distribution accounts are provided from the vendor master, but other items require complete entry rather than selection from a table of predefined codes. Invoices can be selected for payment using due date, discount date, vendor code, or payment priority flags. To streamline data entry, SBT does not force a printed audit trail except prior to period closing. But the audit trail can be displayed or printed at any time from the reports menu.

You can maintain an unlimited number of recurring payables. Unlike the case with recurring journal entries, you can modify both the distribution account and amount. Accounting clerks will appreciate the ease and effectiveness of check voiding. As long as you maintain history information, voiding a check recreates the appropriate open invoice(s) and properly reports the transaction to the G/L.

Invoices can be approved for payment by invoice number, vendor, discount date, or due date. Checks may be printed by checking account, payment priority, and

lected A/P journal allows you to review activity sorted either by batch or by account number.

## PURCHASING

Purchasing and Inventory are provided in Purchase; this may be used standalone or with Payables. Inventory is also built into Orders (Order Entry), and the files may be shared by both programs.

Purchase orders may be standard orders, returns, or bids. When you are entering an order, you can assign the order number manually. If automatic numbering is used, keep a sharp lookout: the system-assigned numbers flash on-screen quickly as the order is completed. Vendor defaults are used for tax rate and terms; ship-via, freight, FOB, and confirm-to fields are available. There is no multiple ship-to address file for drop shipments.

The line item detail includes the item number, extended description, vendor part number, requested ship date, order quantity, and unit cost. Quick Maintenance lets you add new inventory items without leav-

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**SUPPORT AND DOCUMENTATION**

Both vertical industry partners and value-added resellers are key facets of *SBT's* design strategy. Third-party software that integrates or interfaces with *SBT's* basic modules is available for businesses as diverse as beauty salons and contractors.

The company's comprehensive training includes newsletters, video training, training books, tutorials, and executive management classes.

The professional documentation includes a clear explanation of programming standards, program structure, and full-file layouts. Free technical support is provided with a 1-day maximum response time. Priority services are also available for a fee. An electronic bulletin board, TeleNetwork, offers additional support; you can download recent changes to the system from TeleNetwork and participate in dialogues on implementation, customization, and related third-party products.

*SBT* places a strong emphasis on real-time management information, and if that's the main benefit you want from your accounting system, this package is worth a look. Consistent menu designs, data entry screens, and processing sequences show the company's desire to make *SBT* comprehensible; extensive third-party add-in products, combined with the ability to modify the package easily and the availability of well-rounded technical support, add to its attractiveness. But if you are looking for a fast, minicomputer-beating, full-featured accounting package, you'll do better elsewhere.

**Solomon III**

by Suzie Colvin, Timothy Lee,  
and Tom White

TLB's *Solomon III* has gained a reputation as a premier high-end integrated accounting package. Since Version 4.03 won *PC Magazine's* Editor's Choice award ("High-Priced Bookkeepers," September 15, 1987), the product's ease of use and functionality have been further enhanced. Nonetheless, Version 5.1's processing performance in a demanding multiuser environment is weaker than that of much of its competition.

*Solomon III's* labor-saving data entry features include an easy-to-use interface and thorough layouts for vendor and customer master files. Pressing a slash (/) displays a window-based interface with drop-

down menus. Pressing F3, the "inquiry" key, lets you point and shoot to fill a data field from a list of valid entry choices—a valuable time-saver when you are entering G/L accounts, customers, vendors, or inventory item numbers. Quick Maintenance allows you to enter new vendors and customers during the voucher and invoice entry process.

Pressing the F1 key gives you on-line context-sensitive help that matches well-organized and thorough documentation. *Solomon III* leads other high-end LAN accounting vendors with strong national support and a user group network. Training courses are being held at over 40 training sites on a continuing basis; telephone support, newsletters, bulletin boards, and semiannual upgrades are available direct from TLB.

*Solomon III* is further distinguished by fault-tolerance features that maintain data integrity and database usability after a hardware failure. Such advanced procedures are normally found only in minicomputer and mainframe packages because of the programming complexity and processing speed they require.

*Physical fault tolerance* synchronizes an index with records in a file to ensure that the file is complete. *Media fault tolerance* is supported by maintaining "log files" of all accesses to the database. If you back up these few files each day, you can always use them with your last backup of the full database to recover your work. *Logical fault tolerance* is the ability to maintain data integrity or restore it after any failure; you are informed whenever the last access to a database ended abnormally. Version 6.0 of *Solomon III* (which will be available by the time you read this) includes a well-implemented checkpoint restart on long processes that allows you to continue processing after recovering from failure. In some other high-end packages, if a process ends abnormally, you have to perform it again.

**GENERAL LEDGER**

*Solomon III's* hub, the G/L, must be used with the appropriate System Manager module to run any other module in the system. Four standard charts of accounts with 14 financial statement reports are available for modification and use. You can also design your own.

A structured and logical design of your chart of accounts lets you use the simple

but powerful "wildcard" masking and ranging functions to select data for custom reporting. You can also use subaccount code capture data for reporting. For example, you can use a five-digit subaccount number in which the first two digits are the location or division, the third is the department, and the last two represent a product group. Then you would use the same detailed trial balance report definition to print different reports.

Specifying a consolidation of selected

**SOLOMON III  
Suitability  
To Task**

	0	1	2	3	4
General Accounting (GAAP)					✓
Financial Accounting				✓	
Enterprise Management Reporting			✓		
Decision Support				✓	

accounts lets you maintain databases for individual companies or organizational units and consolidate them into a single database. Each account has three memo fields to track budgets or other data: for example, a dollar budget on a product account with the budgeted and actual number of items sold.

Although you must close all modules at period end, data may be entered into any of the past 13 fiscal periods or into future accounting periods. A unique source reference for every G/L entry strengthens your audit trail.

Recurring entries use a simple template to make monthly closing easier. They can be established in the G/L, A/P, and A/R modules. Recurring entries can have constant account numbers and amounts for items like depreciation or rent, or constant account numbers and changing amounts for items like utility bills.

**ACCOUNTS PAYABLE**

A/P serves the needs of businesses requiring strong accounting controls and excellent reporting. Labor-saving data entry and payment selection features contribute to the strength of this module. It can be integrated with both Purchasing and Job Cost-

## INVENTORY CONTROL

Inventory Control does a good job of identifying and tracking specific lot and serial-number inventory items, classes of inventory items, multiple warehouse locations, and measure conversions. You can make the module automatically update items sold out of O/E and Invoicing and items purchased and received through Purchasing. Integration with the Sales Analysis module can produce detailed management analyses of sales by product class and individual part number.

A thorough inventory master file allows you to identify a product class, substitute products, and reorder level and quantity. Based on O/E and Purchasing activity, it can automatically update quantities on hand, sales orders, and period-to-date and year-to-date sales.

Costing methods include FIFO, LIFO, average cost, specific identification, and user-defined cost methods. In addition to quantity discounts, pricing levels can be based on almost any factor, including amount of demand, inventory, and shipping quantities. The software easily and efficiently supports automatic price increases across a range of product items or classes. Cost of goods sold is calculated based on actual sales and can be automatically posted to the G/L.

Physical counts are the basis of a standard physical inventory report. After counting the actual inventory, you enter the count variance on a separate screen to adjust the inventory quantities and value. Since *Solomon III* does not directly support a bill of materials or assembly features, it is probably best suited for a finished-goods inventory situation.

ing; Job Costing allows you to code each invoice line item to a particular job and phase code. This feature is useful for tracking expenses to capital budgets or specific projects.

Defining defaults for each vendor (for items such as expense account numbers and payment terms) will save data entry time. You can select invoices for payment by due date or discount date. To narrow your list of payments, you can easily enter exception criteria that screen the list of selected vouchers or vendors.

Handling checks is also easy. Voiding a check reestablishes the invoices and reverses the account entries. You can record manual checks, make partial payments on multiple checking accounts, and prepare a list of outstanding checks to assist in your bank reconciliation process.

### ACCOUNTS RECEIVABLE

A/R can print statements and process recurring manual invoices. It can be integrated with the Sales Analysis, Address, and Order Entry/Invoicing modules, but printing individual customer invoices must be done directly from the Order Entry/Invoicing module.

You will save data entry time by using defaults for your customers to define payment terms, three tax rates, O/E price levels, separate billing and multiple ship-to addresses, flags for partial shipments, product substitution, statements and dunning notices, and customer classification codes. *Solomon III* tracks period-to-date and year-to-date sales and payment data and also allows comparative data to be maintained.

Solomon III's inquiry key allows you to point to a selection in a list of valid entry choices and fill in the account code. This screen also shows the "quick maintenance" feature, which lets you add a new vendor to your list without leaving the voucher entry screen.

You can display this data in customer inquiry or use it as selection criteria in printing sales analysis reports. The Sales Analysis or the Report and Graph Designer module may be used to generate excellent management and marketing reports using customer classifications and salesperson codes.

You can quickly and automatically apply payments against specific invoices or manually apply partial payments on an individual-item basis against a specific invoice.

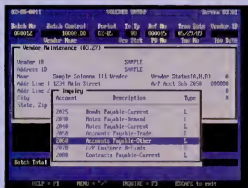
**ORDER ENTRY/INVOICING**

The well-designed O/E and Invoicing module can be integrated with Inventory Control. If you are in a service industry, you may not even need the Inventory Control module, since O/E supports invoicing and debit/credit memos for sales returns, adjustments, and exchanges.

Invoices can have an unlimited number of line items, and taxes and G/L accounts can be specified for each item. But discounts cannot be automatically applied on a line-item basis, and the system falls short if your customers require that you reference their purchase orders on this basis.

During data entry, defaults are filled in from the customer record. Credit balances and customer statistical information are updated when the invoice is printed.

You can process regular orders, standard orders, cash orders, back orders, drop shipments, blanket orders, and price quotes. Using the substitution or partial-shipment flags on the customer master can help your O/E clerk make decisions that will avoid lost sales.



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—PC Magazine, June 13, 1989, page 228



EDITOR'S CHOICE  
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June 13, 1989

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LAN APPLICATION SOFTWARE  
ACCOUNTING SOFTWARE



#### EDITOR'S CHOICE

- Great Plains Accounting Series
- Macola
- Platinum Series

Remember that with accounting software, the best product for you may not necessarily be one of our Editor's Choices. Even the least capable product here might, for example, have a vertical module that gives you just what you need.

Once that has been said, the overall performance winner is clearly *Macola*. If any package is most capable of replacing a mini-based accounting system, *Macola* is the one. Even though its interface could be smoother, its fast times in testing make it a winner.

*Platinum Series* is also very fast and has immense functionality, speed, and flexibility. It's not easy to learn, and its flexible design may increase the opportunities for cooking the books, but that is a flaw worth forgiving.

*Great Plains Accounting Series* wins for ease of use—the best by far in this respect—and for its strong customer support. It's an especially good package for retail use. It is well optimized for networks, though not as feature-rich as some other programs.

Honorable mention goes to *Data*

*Pro Accounting Series*, which would be an Editor's Choice except for its smaller capacity, which prevented it from completing all of our tests. Nevertheless, it's extremely rich in features, and its consistent user interface is smooth. The program also has a powerful selection of vertical-market packages.

Of the remaining contenders, *AccPac Plus* has lots of innovative features but is just a shade below the competition in overall functionality and performance. At the same time, its use of expanded RAM could give it a real performance advantage.

*RealWorld Accounting System* is a mature, stable product but slow on a network. *Solomon III* is extremely strong in a single-user environment, but its network performance is also very slow. *SBT Database Accounting Library* is not even close to the rest in functionality or speed. This package is for the *dBASE* VAR who wants to add lots of industry specificity to a basic accounting package. One of its hundreds of vertical versions could well be the right choice if you have special needs.

#### CUSTOMIZATION

Source code is not available for *Solomon III*, but it does have an External Systems Interface module, a Report and Graph Designer module, and *Off the Shelf* "customizations" to meet many unique requirements. *Off the Shelf* packages run about \$100 and are modifications made to expand field sizes, remove unnecessary fields from screens or printed documents, or even change cursor movement within a screen. Custom revisions of forms or reports are available and cost about \$95 per hour of programming.

The External Systems Interface module lets you export and import data files or master files for transactions. Its error-checking capabilities ensure that batches are not duplicated and that a strong audit trail exists.

The *Solomon III Developers Directory*

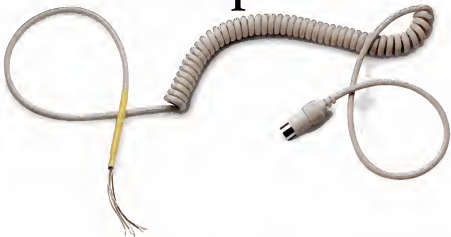
lists manufacturing, nonprofit, legal, property management, and other vertical packages that interface with this software's modules. You can select packages to support your unique requirements and retain the strength of the financial modules of *Solomon III*.

The Report and Graph Designer module is extremely powerful, allowing you to harness the information value of your accounting data. The menu-driven interface provides easily understood prompts to guide you in extracting data from the complete accounting database and in presenting output in graphic and textual formats, including ASCII and *Lotus 1-2-3* file formats.

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### MULTIUSER ENVIRONMENT

*Solomon III* is written in C and uses the *MDBS* database. *MDBS* is similar to the sophisticated relational database architectures found on mainframes and some mini-computers. Unfortunately, *Solomon III*'s degradation during our benchmark testing suggests that its elegance isn't efficient. The database environment and programming that allow *Solomon III* to minimize data redundancy, while helping to provide data integrity and fault tolerance, appear to be the chief culprits in its sluggish performance.

Its impaired performance in high-activity situations was worsened by using a dedicated workstation as the database server. If you plan to use multiuser Version 5.1, a dedicated 286 workstation or better should be part of your initial costs.

While three databases can be open simultaneously, allowing up to 30 users, the benchmark test results suggest that the database server should provide the data to one requester at a time. *MDBS* and *TLB* are developing solutions to the sluggish performance, but they were not commercially available during testing.

The basic multiple-user features are sound. Record and file locking are well implemented, with automatic retry available when a record is locked for update. Each user can specify individual printer-routing options. If you need to change the routing, an option on the pop-down menu is available to redirect reports.

Module prices average \$795. A five-user Network Manager module is an additional \$795.

*Solomon III* remains a perennial strong performer in the general accounting arena. In addition, it allows integration with many vertical-market packages. Yet benchmark test results furnish dramatic evidence that its multiuser processing performance lags behind other high-end packages. It is best implemented in small to midmarket companies that do not require high-volume multiuser activity.

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Hard Drive Type	IDE Built-In		Can use - RLL, MFM, IDE, ESDI	
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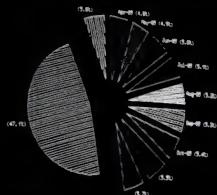
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## IMPOSING EFFICIENCY:



# Workgroup Productivity Software

by Frank J. Derfler, Jr.

**What is "groupware" anyway? Programs that turn your LAN into a tool for scheduling meetings and resources can work well if everyone plays along. PC LAN Labs evaluates nine top packages.**

It seems like everyone—from seminar speakers to industry watchers to computer journalists—has an opinion on the definition of workgroup productivity software. While some draw the category broadly enough to include any multiuser software, others defend only certain categories of software—such as project management or document control packages—as being applicable.

PC Magazine uses a pretty strict definition of workgroup productivity software: we have excluded standard applications running on a network and have focused on nine packages unique to a network or multiuser environment. For example, we have included group-scheduling or calendaring software but have excluded multiuser spreadsheet programs. One of the reasons behind this decision is that we firmly believe that scheduling or calendaring programs are an important part of this category of software. For products that specialize in electronic-mail transmission, see "LAN E-Mail: Spreading the Network News" in this issue.



## LAN APPLICATION SOFTWARE WORKGROUP COMPUTING

These criteria narrowly eliminated Ashton-Tate's *Framework III* from this review. While *Framework III* includes electronic mail and even a well-designed interface to the Message Handling Service protocol, it lacks the scheduling capability and other workgroup productivity enhancers found in the products reviewed here.

The workgroup productivity software that made the final cut included *Higgins*, *Network Scheduler*, *Office Works*, *Pack-Rat*, *Right Hand Man*, *Shoebox 3*, *Szygy*, *Tandy Workgroup Companion*, and *Word-Perfect Office*. These packages range in price from \$50 per node to \$250 per node, typically run with a wide variety of networking software, and have no sensitivity to the network interface cards or cabling used in the LAN.

### THE SCHEDULE DILEMMA

Scheduling three or more busy people for a meeting, along with arranging for facilities like a conference room and a slide projector, can be a frustrating and time-consuming task, requiring at least three phone calls. If one person or facility isn't available at the time the other people or facilities are, a whole series of negotiations begins. Mathematicians refer to it as progressive approximation; you (or your secretary making the arrangements) call it frustration. Before the scheduling problem is resolved, the number of people involved and phone calls made may have increased dramatically.

LAN scheduling products simplify this task and often completely remove the frustration. With these packages, one person can access the public calendars of other persons and resources to quickly find out when everyone involved has free time that can be used to hold a meeting or other event. The process doesn't involve any invasion of privacy—the person planning the meeting doesn't see every detail on a personal calendar, just enough to find the free time.

### VARIATIONS IN APPROACH

The programs reviewed vary in how they present free time. Some packages, like *Higgins*, display graphs of conflicting and open schedules. *Right Hand Man* and other programs overlay calendar pages, while a few use text explanations to outline the scheduling options. Powercore's *Network Scheduler* offers a series of different views of how you and others in the workgroup spend your time.

Scheduling programs also vary in how they confirm the proposed events. The simpler packages assume that if the event fits on the calendar, the people scheduled to attend will be there. Other programs ask for confirmation, while some go as far as to tie into electronic-mail modules for notification.

One problem common to all of these packages is that they don't provide an easy way to schedule individual resources. Since a group of resources, like three con-

Even the best  
group scheduling  
software is utterly  
useless if people  
aren't willing to  
play the game  
by keeping their  
personal calendars  
up to date.

ference rooms or three slide projectors, usually has only one manager, it's unnecessary and silly to make that person repeatedly check into a separate personal calendar module to confirm the scheduled use of each room or device. The person scheduling the meeting and the person managing the resources should not have to treat each identical projector, VCR, viewing screen, or meeting room as a separate entity.

The best scheduling software is utterly useless if people aren't willing to play the game by keeping their personal calendars current. Obviously, these personal calendars are at the heart of the group-scheduling process—calendars that aren't readily available or easy to use will never be maintained by group participants. With this in mind, it seems imperative that these programs allow you to run the personal calendar module as a TSR (Terminate and Stay Resident) and make it easy to use. At the same time, program developers must be conscious that the amount of memory a

TSR module consumes is an important consideration.

### E-MAIL AND MORE ON-BOARD

Many of the products in this category include electronic-mail features. With the notable and commendable exception of *Higgins*, though, the e-mail programs in these packages don't have the wide variety of features found in the special-purpose e-mail programs evaluated in this issue's article "LAN E-Mail: Spreading the Network News." All of the packages in this collection that have integrated e-mail do a fine job within a self-contained homogeneous network, but with the exception of *Higgins*, they run out of horsepower when you need to communicate with dissimilar mail systems on other networks or on larger computers.

In addition to scheduling capabilities and electronic mail, these packages offer a variety of productivity utilities. The names and telephone numbers of the people you do business with are a valuable resource to your organization—the networked utility we use most in the PC LAN Labs is the shared telephone directory found in *Right Hand Man*. A telephone directory published on paper takes a lot of resources to prepare and update, but it's a different story when each user on a LAN contributes to and maintains an electronic telephone directory. The process is quick and simple, and the results are current. In addition, looking up a listing in an electronic phone book sure beats fumbling with business cards or photocopied lists of names.

Many people on networks in larger offices take advantage of multiuser chat programs. These programs substitute an on-screen real-time discussion for a face-to-face meeting or a telephone conference call. When two or more people use one of these programs on the LAN, the screen on each PC divides horizontally into a separate window for each user. The text that you type appears as you enter it in the window with your name. It's an ideal way for three or four people to conduct a fast exchange of ideas without getting up from their desks.

Other shared resources available in productivity packages include document indexes and notepads. Many of the packages also include personal productivity tools, such as calculators and private telephone directories.

Workgroup productivity packages can effectively reduce the hassle of managing the daily activities of corporate employees.

These packages alone don't provide sufficient justification for installing a network if you haven't already got one, but if you can also take advantage of a network's file- and printer-sharing capabilities, the increased productivity and reduced frustration these programs provide can be a welcome dividend from your LAN investment.

Frank J. Derfler, Jr., is *workgroup systems editor* of PC Magazine.

## Higgins

by Patricia A. McGovern

When the people at Enable Software/Higgins Group titled their \$995 groupware package *Higgins*, they hoped the name would evoke the Hollywood image of the veddy, veddy proper, precise, and controlled British butler. It appears that their hopes were well placed, as the software performs true to that image.

*Higgins* begins to distinguish itself with its excellent documentation and ease of installation. The System Administrator allows each user to log in two passwords: the public password allows other members access to the user's data, while the second guards the user's more confidential information. Once you log onto *Higgins*, the clean interface displays the current month's calendar and the day's events.

The menu options are arrayed along the lower screen line. You select the options by keying the appropriate letter or using the Spacebar to highlight the selection. Function-key shortcuts are also included. The one-line description of the menu and function-key commands on the screen's lower left can prove very helpful to new users.

Any events scheduled for the current day show as, in chart format, a shaded time block. The scale of that schedule covers only the hours of 7 a.m. to 6 p.m., indicating any later events with a plus sign. You may change the hours displayed by going through the Utilities Identification Menu.

### LOGGING IN EVENTS

The Log option allows you to input events into your own schedule. When you have logged in an appointment for the current date, the Log window in the main menu displays the time and a short description of

the event and allows you to view text that further elaborates on the event. Within the Log menu you view the entire month, the week's schedule, and the current day's events all at once.

The Log's Tentative option, new in Version 2.27, makes provisions for events that are not blocked off on weekly or daily schedules because they have no specific ending times. The block of time logged in for a Tentative event is only partially shaded, helping to clarify any misunderstandings in scheduling.

You have the option of attaching any events you log in to a Directory, although the program's designers should have called this feature a reference list. The Directory is actually an electronic card file that instructs a user on linking events, appointments, mailing, telephoning, and to-do features with a list of people, companies, and even keywords. In Directory, the Order function sorts the listings by name or company.

The To-Do command does what the name implies. Entries created in a to-do list can be labeled as opened or done, and a priority status can be attached. While the To-Do feature is similar to the Log function, it expands upon Log by offering a structured environment in which to input information like project names and due dates.

### EFFICIENT COORDINATION

The Scheduler feature in *Higgins* outperforms the schedulers in almost all of the other programs we reviewed. You are able to view the available time slots of users on your network and then set up meetings based on the most convenient times for everyone involved. If you can't determine the best available times, the program stands by, ready to suggest them for you. Recipients of your request can respond with a yes/no answer.

To maintain privacy, Scheduler does not allow you to view the actual events in another person's schedule unless that person allows you to. The Scheduler also can lock your monitor so that no one can get into your files, even when you are still active in *Higgins*. An End of Month feature lets you clear out old appointments and schedules and save them on floppy disks.

While the Expense feature performs calculations for the various categories—food, lodging, travel, and so forth—and offers an on-screen tape with totals,

the program does not include a separate calculator. It also does not offer a real-time chat capability.


### ADMIRABLE E-MAIL FEATURES

*Higgins E-Mail*, a \$495 add-on package, provides electronic-mail services unmatched by other group productivity packages, albeit with a fairly steep price tag. The program lets the System Administrator set up a list of possible recipients for all users on the LAN; you can call up this list via the mail routing option. *Higgins E-Mail* also allows you to maintain your own private mailing lists.


In the Notewriter screen, you can fill out the message and send it to one or more users. With the Forward command, forwarding your own mail to another station, and even keeping a copy for yourself, is a breeze! *Higgins E-Mail* enables you to sift through the mail and search by content, key, or project words.

Unlike *Higgins*, which for all its excellent features fails to provide RAM-resident modules, the *Higgins* MailCall function resides in memory and alerts you to incoming mail without disrupting your current application. MailCall takes up 2.5K RAM and loads by default (unless you decide otherwise) when you log into *Higgins*.

*Higgins Exchange*, *Higgins Remote*, *Higgins API*, and *Higgins Gateways* are separately purchased programs that enhance the standard tasks of *Higgins*. *Remote*, *API*, and *Gateways* must be used in


**FACT FILE**  
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*Higgins*, Version 2.27  
 Enable Software/  
 Higgins Group, 1150  
 Marina Village Pkwy.,  
 #101, Alameda, CA  
 94501; (415) 430-8875  
 List Price: *Higgins LAN*  
 Packages for 20 users,  
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 for 20 users, \$495;  
*Higgins Exchange*,  
 \$1,595; *Higgins Remote*, \$395; *Higgins API*,  
 \$995; *Higgins Gateways*: To:3Com +, \$495;  
 To:PROFS, \$995; To:FAX, \$995; To:MHS, \$495;  
 To:SNADS, \$995 to \$2,065, depending upon  
 configuration.  
 Requires: 512K RAM, DOS 3.1 or later.  
 DESQview and Microsoft Windows 286/386 are  
 supported.  
 In Short: In itself, *Higgins* sports a wide variety of  
 complete features. Accompanied by the  
 additional e-mail packages, it covers all of the  
 bases for serious office management. But be  
 prepared to meet the price.



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conjunction with *Higgins Exchange* to manage mail distribution among LANs and remote users, separate LANs, and servers on a LAN, as well as between *Higgins* and other gateways to a variety of mail systems. *Exchange* must be used with *Higgins* on a dedicated PC.

*Higgins Remote* works for those out-of-office users who want to stay in touch with their main server. The remote user, calling in through a modem, becomes a member of the workgroup. *Remote* comes ready to handle up to five remote users.

The *Higgins Group* offers five gateway interfaces from *Higgins* to MHS, SNADS, 3Com's 3+, PROFS, and fax. Each of these gateways must use the *Higgins API* interface program. *Higgins To:PROFS* requires Novell 327x emulation hardware and software. *Higgins To:MHS* connects to those systems supporting the Action Technologies/Novell MHS specification. *Higgins To:3Com3+* must run on a 3Com LAN running 3+Mail. *Higgins To:FAX* uses one gateway to serve the entire *Higgins* network, including remote users. It also requires the Intel Connection Coprocessor board and can supersede standard modems with its 9,600-bit-per-second transfer time.

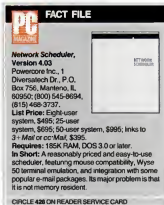
*Higgins* and its adjunct products make for a very cozy groupware system. Just about every option you'll really need for group communications and scheduling (with the exception of RAM-resident modes), as well as some handy personal-management features, is found in this product. Add to that the ability to connect to a variety of foreign mail systems through add-on modules and the *Higgins* line emerges as a strong contender.

## Network Scheduler

by M. Keith Thompson

*Network Scheduler* from Powercore (formerly SumWare) gives LAN users a helping hand when it comes to scheduling events, writing letters, and tracking names and addresses. The \$495 package supports eight users and works on *NetWare*- and *MS-Net*-based networks.

In its favor, the program is easily installed; we had it up and running in 5 minutes. Simply type STIN and tell *Network Scheduler* the server drive and directory to use. The first time each workstation runs the program ST, *Network Scheduler* inter-



rogates the network for the user name and then sets up the necessary directories.

One significant disadvantage, however, is that the program is not a TSR. This certainly makes it more cumbersome for users to check their calendars and keep them up to date, abilities that are vital to the success of any scheduling program.

*Network Scheduler* has a smooth user interface sporting multiple windows. Simple pull-down and pop-up menus allow access to all of the modules and administrative functions. The software automatically detects the presence of a Microsoft (or compatible) mouse driver. If you're not a mouse user, the Arrow keys and Alt and function-key commands let you easily interact with the program. One gripe: Enhanced keyboard users will be hit with a message to turn off the Num Lock key every time they run the program and won't be able to do anything until they comply with the request. An interface conforming to IBM SAA specifications was released too late for inclusion in this review.

### DAY-BY-DAY ACTIVITIES

Calendar provides a quick overview of the entire month and a graphic display of daily schedules, with hours divided into 10-minute intervals. This permits you to find a convenient day and time quickly so that you can set up a meeting. The magnified day cell provides a graphic representation highlighting overlapping events on the day's schedule.

Closely tied to the calendar function is Time Manager, which provides the means to organize, coordinate, and communicate individual and group schedules. By updat-

ing each user's calendar in real time, every group member is aware of appointments as they happen.

A blinking date in the calendar notifies the users of a pending meeting. The meeting confirmation process is fast and easy: you simply display the meeting information and press C to confirm or D to decline.

You can garner a variety of information stored in the calendar database based on combinations of Month, Year, Who, Where, and Why field selections. You can display, count, or print out any of the events that correspond to your field selections—for example, every meeting in March that the CEO has been invited to attend.

Since security is always a concern, Powercore provides additional protection with the STSECURE module. This program allows the network manager to create the user's password and privacy level. Users with lower privacy levels (levels run from 0 to 9) cannot view the details of or change an appointment filed by a higher-level user. If you have the same level of security as the creator of an appointment, you can view all details pertaining to it but you cannot change the appointment. Higher-level users can view or change all appointments entered by lower-level users. An additional security feature lets you grant a specific person the power to make or confirm meetings on your behalf.

The Appointment Book is basically a personal function that allows you to view, list, and update your scheduled events. Each row in the appointment book corresponds to one time interval (time can be broken down into 15-, 30-, or 60-minute intervals).

### EDITING, ADDRESSING, EMULATING

Letter Writer is a primitive editor that basically acts as a notepad. It is sufficient to handle letters, memos, or short notes, allowing only 74 characters per line and limiting files to 16,000 characters or 32 pages (whichever comes first).

Letter Writer automatically saves a file containing uncompleted text each time you exit and retrieves it for you when you re-enter the module. If you don't want the program to retrieve the file for you, simply save it before exiting.

FileDex is a simple-to-use electronic address book. Each FileDex entry may contain up to eight user-defined fields plus five name/address lines. FileDex supports sorting by any field and can dial phone numbers stored in the record. A nice fea-

# Compare Printer Sharing Devices, SL is the best.

Feature Description	Competition	SL	SL Advantage
Number of total ports	8	10	25%
Number of serial ports (input or output)	4	6	50%
Number of parallel ports	2 input, 2 output	4 input or output	up to 100%
Maximum serial data transfer speed	9,600 bps	38,400 bps	400%
Maximum buffer size available	1MB	4MB	400%
Maximum number of cascaded devices	45	Millions	Millions %
Menus pop-up over graphics/DTP	No	Yes	Convenience
Power supply	External	Internal	Reliability
Price for each unit with 256KB buffer	\$695	\$600	14% Less
Price for each unit with 512KB buffer	\$795	\$700	12% Less
Price for each unit with 1MB buffer	\$1,095	\$900	18% Less

- **38,400 bps:** transfer serial data at 4 times faster than normal serial speed—the speed of parallel with all the advantages of serial (bi-directional communication, etc.).
- **Ten channels:** four parallel and six serial, all can be software configured as either input or output.
- **Pop-up Menu:** keyboard selection of printers, macros and many other control functions.
- **Automatic Switching:** no software needed if always sending data to only one printer.
- **Interface Conversion:** automatic parallel to serial, serial to parallel, or serial to serial parameters.
- **Compatible with Minis or Mainframes:** any RS-232-C asynchronous serial or parallel connection.
- **User Upgradable Memory:** from 0 to 4MB buffer.
- **45 Day Money Back Satisfaction Guarantee.**



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Salem, OR 97302



# WORKGROUP COMPUTING: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	Higgins	Network Scheduler	Office Works	PackRat	Right Hand Man	Shoebox 3
TSR implementation (RAM required)	○	○	○	○*	● (64K)	● (198K)
<b>SCHEDULING MODULE</b>						
Meeting times displayed in graph or chart	●	●	●	○	●	○
Flexible schedule (beyond 8:00 to 5:00)	●	●	●	●	○	●
Resources scheduled individually	●	●	○	●	○	○
Notification of meetings by e-mail	●	Optional (\$395)	●	○	○	●
Notification acknowledgment required	○	●	○	User-selectable	○	●
<b>TELEPHONE UTILITY</b>						
Telephone utility	●	○	●	●	●	○
Telephone directory	●	N/A	●	●	●	N/A
Autodialer	●	N/A	●	●	●	N/A
Directory subject to public editing	●	N/A	●	●	●	N/A
Directory sorted alphabetically	●	N/A	●	●	●	N/A
Directory sorted by area code	○	N/A	○	○	●	N/A
Directory sorted by ZIP code	○	N/A	●	●	●	N/A
Automatic message notification at sign-on	●	N/A	●	●	●	N/A
<b>CALCULATOR</b>						
Business calculator	●	○	○	○	●	○
Scientific calculator	○	○	○	○	●	○
Programming calculator	○	○	○	○	●	○
Paper tape display	○	N/A	N/A	N/A	●	N/A
<b>NOTEPAD UTILITY</b>						
Notepad	●	○	○	●	●	●
Automatic line wrap	●	N/A	N/A	●	●	●
ASCII file creation	●	N/A	N/A	●	●	●
ASCII files imported	●	N/A	N/A	●	●	●
Notepad sharing available	●	N/A	N/A	●	●	○
<b>GROUP PRODUCTIVITY</b>						
Document index (file manager)	●	○	●	●	●	○
Index sorting by name	●	N/A	●	○	●	N/A
Index sorting by date	●	N/A	●	●	●	N/A
Group chat capability	○	○	○	○	●	○
Maximum number of participants on-screen	N/A	N/A	N/A	N/A	5	N/A
Password protection	●	●	●	●	●	●
User-selected passwords	●	○	●	●	●	○

— Editor's Choice ● — Yes ○ — No

N/A — Not applicable; product does not have this feature.

\* PackRat runs under Windows, a multitasking environment where TSR capability becomes irrelevant.

# LAN APPLICATION SOFTWARE WORKGROUP COMPUTING

ture is the ability to combine the entries in FileDex with the output from Letter Writer to create form letters that merge text with names and addresses.

*Network Scheduler* also includes Terminal, a little package that emulates a Wyse 50 terminal and communicates through a selected COM port. Unfortunately, the terminal program is of limited usefulness because it lacks such features as the ability to send and capture data files.

## E-MAIL INTEGRATION

Powercore chose not to include e-mail with *Network Scheduler*; instead, it has integrated the package into the existing e-mail world with direct links to 3+ Mail and cc:Mail.

*Network Scheduler* has received the endorsement of Action Technologies, which integrates the package into *The Coordinator II*, its well-known conversation director and LAN e-mail program (see review in this issue).

*Network Scheduler* is a useful workgroup coordinating tool, whose attractive features include the presentation of scheduling data in an easily intelligible graphical manner, easy installation, and integration with popular e-mail packages. The recent addition of advanced security features and an SAA-compatible menu system (not reviewed here) can only add to its appeal. However, the need to run the program in standalone mode instead of as a TSR module has a dampening effect on an otherwise attractive package.

## Office Works

by Patricia A. McGovern

Data Access's \$495 *Office Works* comes packaged with the expected groupware ingredients: calendar/scheduling, e-mail, a name/address index, phone message forms, and document control.

Installation is a simple procedure, and user names and passwords are created by the network supervisor via the Administrative Add User option. Each user can be assigned certain rights and privileges and can also be selected as an alternate. Alternates can act on another user's behalf when that user is out of the office; they are able to access the absent user's e-mail, calendar, and document-control functions.

Once you're into *Office Works*, the screen displays options on a pull-down menu at the top, with the date noted at the right. You use Arrow keys to highlight the options; in addition, Flex-Keys (function keys that can be assigned to perform customized movements) can be selected by the network supervisor during setup.

While *Office Works* does offer help via the F1 function key, I prefer an interface that maintains constant on-line help along the bottom of the screen. This would be particularly helpful in a program like *Office Works*, where some of the keystrokes are nonintuitive. For instance, sending a message is accomplished via the F10 key, but there's no way of knowing that it does without checking the manual or calling up help. Once you get to know the features, it makes sense, but the learning curve for first-time users will be in a low dip for a while.

## E-MAIL ABILITIES

The e-mail portion of *Office Works* is simple and basic; it even includes a mail-notification TSR. Right now, this is the only portion of *Office Works* that runs in TSR mode. In Version 2.0, projected for release at the end of 1989, the entire e-mail function will have the ability to run as a TSR. Third-party gateways to other mail systems are also planned, but no shipping dates or details on the type of gateways were available.

Once you've viewed your mail, you have the options of responding, posting the mail to an Old Mail list, or archiving the mail for storage. When it comes to sending mail, you can include ASCII files, and, if the supervisor has designated the type of word processor you use, you can also include your word processor files. From the e-mail menu you can also view old mail or unfinished mail in need of a response. The recipients may be *Office Works* users on the network, remote recipients calling in through a modem, or a mixture of these, and messages may be sent by telex, fax, or postal service. The sender can request a return receipt, and the recipient can standardize his system so that a return receipt automatically gets sent.

## LONG-TERM PERSPECTIVE

The calendar feature of *Office Works*, although it is flawed by not being available as a TSR, has some interesting aspects. Once you select Calendar, a text box listing the events for the current day shows on the screen. To view an event further, sim-

Syzygy	Tandy Workgroup Companion	WordPerfect Office
<input type="radio"/>	<input checked="" type="radio"/> (77K-112K)	<input type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
N/A	<input checked="" type="radio"/>	<input checked="" type="radio"/>
N/A	<input checked="" type="radio"/>	<input checked="" type="radio"/>
N/A	<input checked="" type="radio"/>	<input checked="" type="radio"/>
N/A	<input checked="" type="radio"/>	<input checked="" type="radio"/>
N/A	<input type="radio"/>	<input checked="" type="radio"/>
N/A	<input type="radio"/>	<input checked="" type="radio"/>
N/A	<input checked="" type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
N/A	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
N/A	N/A	N/A
N/A	N/A	N/A
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
N/A	2	N/A
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>


CONTINUES


# LAN APPLICATION SOFTWARE WORKGROUP COMPUTING

ply highlight it and hit Enter. If you want to see what your life is like for the next week, month, or 6 months, the press of a function key makes that possible. The ability to view 6 months at a time, and then touch a key and see the next 6 months makes *Office Works*' calendar function an asset for people who think ahead.

The Calendar feature also gives you the ability to coordinate group meetings or even group reminders. By listing the recipients on the Participant List, *Office Works* will scan their calendars and select the time that has the fewest conflicts for everyone involved. The times available show up blocked in the same graph format that *Higgins* uses. The message for the proposed meeting goes through the e-mail system. Each user has the option of confirming or

declining, and if no response occurs, the meeting lists as tentative.


**FACT FILE**



**Office Works,**  
Version 1.1  
Data Access Corp.,  
14000 SW 119th Ave.,  
Miami, FL 33186; (305)  
238-0012.  
List Price: Six-user  
system, \$495; unlimited  
users, \$1,395.  
Requires: 365K RAM, DOS 3.1 or later.  
In Short: Office Works performs simple and  
undemanding scheduling, personal manage-  
ment, and LAN e-mail tasks. If you have midlevel  
expectations, the features of this package will be  
adequate.

CIRCLE 429 ON READER SERVICE CARD

## OTHER OPTIONS

The Phone option relies on the familiar telephone message form, which can be filled out and sent to another user. After you've taken the message, you can send the same message to other users without having to reenter the text. And once your phone messages reach you, you can store them for review or list the ones that have been received during specified periods.

The *Office Works* package does include a document-control feature. This simple index/filing system takes care of files according to their index entry, owner, date entered, subject, and item date.

Every groupware package has its own



## WORKGROUP COMPUTING: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	PC Higgins	Network Scheduler	Office Works	PackRat	PC Right Hand Man	Shoebox 3
<b>ELECTRONIC MAIL</b>						
Message notification						
TSR message-waiting module (RAM required)	● (2.5K)	○	● (3K)	○	● (52K)	● (none)
On-screen window	●	○	●	○	●	●
Message preparation and transmission						
TSR message-creation module (RAM required)	○	○	○	○	● (52K)	● (198K)
Text editor	●	○	●	○	●	●
Automatic line wrap	●	N/A	●	N/A	●	●
Block moves	○	N/A	○	N/A	●	●
ASCII files imported	●	N/A	●	N/A	●	○
Non-ASCII message attachments allowed	●	N/A	●	N/A	●	○
Gives "return receipt" messages	●	○	●	○	●	●
<b>SECURITY</b>						
Password protection of mailbox	●	○	○	○	●	●
Message file encryption	●	○	○	○	○	○
Message encrypted during LAN transmission	●	○	○	○	○	○
<b>GATEWAYS</b>						
To MHS	Optional (\$495)	○	○	○	○	○
To MCI Mail	○	○	○	○	○	○
To IBM's PROFS	Optional (\$995)	○	○	○	○	○
To X.400	○	○	○	○	○	○
To DEC Mail	○	○	○	○	○	○
To a fax system	Optional (\$995)	○	○	○	○	○

PC — Editor's Choice ● — Yes ○ — No  
N/A — Not applicable; product does not have this feature.

## LAN APPLICATION SOFTWARE WORKGROUP COMPUTING

version of index cards, which allows you to organize people and companies along with telephone numbers and other pertinent information. Names, *Office Works'* basic index feature, immediately furnishes you with the card listing the name of the individual and his company, but you'll have to press the Enter key before you can see the phone number. While *Higgins* allows you to gather a telephone list of a requested group through sorting by company affiliation, for instance, *Office Works* demands that you run a full report to generate this information.

If you have a modem, you'll appreciate *Office Works'* ability to choose the Dial option to phone the person or company whose entry you are viewing. At any time you're viewing a person or company, you

have the option of printing a mailing label, an envelope, or even a Rolodex card. At present, though, you can't just hit a key to see the next person on the Names list.

Support for *Office Works* includes a variety of manuals and an on-line tutorial feature. A technical-support telephone number is available only to a system administrator and only for the purpose of helping to configure the network.

*Office Works* has some nice features, but it is hampered by a near lack of TSR modules, some awkward implementation, and a less-than-comprehensive technical-support system.

## PackRat

by M. Keith Thompson

*PackRat*, from Polaris Software, endows users with a powerful personal information manager as well as a workgroup scheduler. For \$695, you get a three-user license; each additional user costs \$150. That's not cheap, but *PackRat* offers plenty of bang for the buck.

The program runs under *Microsoft Windows*. If you already work in that environment, just create a directory for *PackRat* and copy the files from the program disk. Installing the run time version of *Windows* with *PackRat* takes about 5 minutes and requires you to add a couple of SET commands to your AUTOEXEC.BAT file.

The program is structured around a unique database with multiple-keyword fields that allow quick and flexible retrieval of any of your *PackRat* data. Since *PackRat* performs truncated searches, you have to get only part of the keyword right to find your data. The Keyword feature contains the mechanism for compiling a complete report from all modules—calendar, phone book and log, to-do list, and so forth—on any given subject.

### FROM THE TOP DOWN

Setting up a group meeting with *PackRat* is not difficult, but there is one flaw in the process. First, you select the people or resources you want at the meeting and then choose a range of acceptable dates. *PackRat* digests this information and offers you corresponding times. That's simple enough, but the problem revolves around

user-priority levels (from 1 to 7, with 1 being the highest) set by the system administrator. *PackRat* checks only the calendars of users with a higher priority than yours and assumes you can make users with lower priorities change their plans. This method of scheduling by hierarchy works, but it's easy to see it creating chaos, not to mention dissension, in the lower ranks.

Frequently held meetings—say those that occur every Tuesday at 2 p.m.—can be repeated easily on the calendars of those involved. Alarms that remind you of impending meetings are helpful—you don't want to keep the president of your company waiting for you. You can also use the program to monitor appointments and notes related to any meetings.


### TRACKING FACILITIES


The phone manager consists of two parts: a phone book and a phone log. The phone book includes the standard fields such as name, company name, address, and position, but it also has some nice additions: department, home number, and two keyword search fields. The phone log can be used for automatic dialing and keeps track of the time, date, length of call, and the name of the person you called. Here you also have the option of entering keywords and a 32,000-character note about each call placed or received.

*PackRat's* task list is simply the typical to-do list. Each task must be marked as completed, or it will carry over to the next day until it is accomplished. The program's method of handling each task seems slightly cumbersome at first, however, requiring you to Start the task and

Syzgy	Tandy Workgroup Companion	WordPerfect Office
<input type="radio"/>	<input checked="" type="radio"/> (32K)	<input checked="" type="radio"/> (175K)
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/> (via MHS)	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/> (via MHS)	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ENDS


**FACT FILE**



**PackRat, Version 2.0**  
 Polaris Software, 613  
 W. Valley Pkwy., #323,  
 Escondido, CA 92025;  
 (800) 338-5943, (619)  
 743-7800  
 List Price: Three-user  
 system, \$695, each  
 additional user, \$150  
 Requires: 512K RAM, DOS 3.1 or later. (Mouse  
 recommended.)  
**In Short:** A combination PIM and workgroup  
 scheduler running under *Microsoft Windows*.  
 The addition of PIM-like modules such as a  
 phone manager and expense log, as well as  
 keyword search features, makes this a very  
 usable and likable program. The main drawback  
 is that all workgroup users need a 286- or 386-  
 based machine to use the program effectively.

CIRCLE 842 ON READER SERVICE CARD



then Complete it. For a task as simple as delivering a package or replying to a memo, the extra Start step, though involving only an extra keystroke, seems unnecessary. You do get used to it, though, and will even appreciate it when you are trying to keep track of the progress of various projects. *PackRat* also lets you set priorities, designate keywords, and attach notes to tasks.

The expense log keeps track of all expenses assigned to an unlimited number of expense categories. Notes entered with each expense let you create an additional association with the event, and keywords tie the expenses to other parts of a project.

#### THE WINDOWS ADVANTAGE

Since *PackRat* runs under *Microsoft Windows*, users can easily switch between ap-

plications, making it simple to update schedules. Another advantage of using the *Windows* environment is the ability to exchange data through *Microsoft's DDE* (Dynamic Data Exchange) protocol. The use of DDE permits other *Windows* programs to request data from *PackRat* and use it for their computations. This arrangement lets you maintain just one copy of your data and makes updating your records effortless.

It is possible to rely on *PackRat* alone to exchange electronic messages over the LAN, but doing so is a rudimentary process that lacks such capabilities as replying to and forwarding mail. The *Windows* version of *Da Vinci* is the e-mail program of choice among *PackRat* users, since *Pack-*

*Rat* permits *Da Vinci* users to read and write directly to the in-box, allowing a seamless integration of electronic mail.

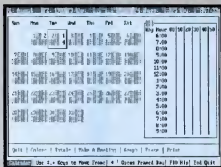
Among the advantages of using a *Windows*-based program lies one important disadvantage. Everyone in the workgroup must use *PackRat* to make it effective as a group scheduler, but *Windows* runs effectively only on 80286 or 80386 machines at a time when many organizations still have plenty of 8086 stations on their LANs.

Despite a less-than-egalitarian scheduling process, *PackRat* offers many attractive inducements, including a variety of tracking features and the ability to retrieve data quickly and flexibly, as well as to exchange data with other *Windows* programs. If its *Windows* requirement poses no problem for your users, this package may be worth your consideration.

## GOOD TIMING: How Workgroup Software Manages Schedules



Higgins lets you see the schedule of any user and plan a meeting for the best time for all involved. It uses overlaid windows and sliding bar menus to put a lot of information on the screen and make it easy to select functions.



At a glance, *Network Scheduler* gives you the number of appointments that you have during the day and details about each one. It's a very complete LAN scheduling package.



Office Works has many basic workgroup features, including electronic mail, a name/address index, document control, and a group scheduling calendar that is easily edited.

## Right Hand Man

by Pamela Watson

FutureSoft Inc. recently released Version 4.20 of their neat little LAN productivity weapon, *Right Hand Man*. The latest update, which ranges in price from \$495 to \$6,500 for 5 to 100 multiuser LAN versions, now boasts 19 productivity modules with network capability.

Once transferred to your local or network server's hard disk, *Right Hand Man* can operate as a TSR. For RAM-conscious users, *Right Hand Man* consumes only 64K in its default configuration, and you can pare that down to 52K by giving up a few options.

The program lets you schedule appoint-

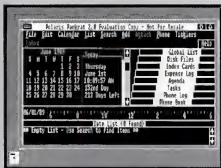
ments for yourself as well as your group, jot down notes, calculate figures, type an envelope, receive telephone messages, generate electronic mail, and edit other files. The software will permit up to 60 windows on-screen at the same time, although there is so much overlapping at that point that you'll hardly be able to see anything. Six or eight windows on-screen at one time is a more practical option. You can perform several tasks at once by moving freely from one window to another and can also adjust the size and placement of the windows on the screen.

### EASY EXCHANGES

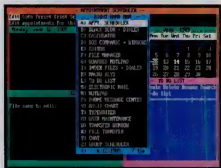
In its \$189 single-user version, *Right Hand Man* acts as a most efficient all-in-one tele-

phone book and message center, as well as reminder calendar, prioritized to-do list, and notepad. However, it is on a LAN that *Right Hand Man* really shines. Each user in the system has private files, as well as access to group information. This means that you can share notes and priority lists for a group project, as well as addresses and telephone numbers, correspondence, and other pertinent information with all those involved. Communication among the members of the group is enhanced through an efficient, though not outstanding, electronic-mail module. The e-mail service offers the standard options, including automatic mail notification, and sending, forwarding, moving, and printing messages. Group meetings and appointments can be scheduled through the Group Scheduler.

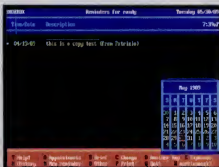
CONTINUES



PackRat is a scheduler application that runs under Microsoft Windows. And through Microsoft's DDE protocol the program can store and retrieve related and unrelated information in text format.



*Right Hand Man* operates as a TSR and keeps its many functions at your fingertips. Its multiple-window environment lets you pop up any of its functions, including electronic mail and scheduling, over other applications.



Shoebox 3 gives reminders of appointments and allows you to file expenses. The program isn't restrictive and allows flexibility in how you enter and retrieve data.

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# LAN APPLICATION SOFTWARE WORKGROUP COMPUTING

In *Right Hand Man's* multiuser versions, all shared information can be accessed, altered, or even deleted by any user, making it imperative that everyone who's using the system double-check themselves before embarking on operations. Personal files such as the Guarded Notepad and the Black Book Dialer are accessed via a password that the owner establishes at the creation of the file and are not open to public scrutiny.

Using a chart format in the Group Scheduler, any user can set meetings and appointments for the entire group or just for specified individuals. You can create an entry, delete it, look ahead to the next month or even the next year, and view the day in question to see who is available and who isn't. In default mode, the scheduler displays only the time from 8:00 A.M. un-

til 5:30 P.M., but a setup option lets you change the hours to suit your needs. Like the other programs we evaluated, *Right Hand Man* doesn't do a very good job of scheduling resources such as meeting rooms or audiovisual equipment, requiring these items to be listed as users.

One of the most useful features of *Right Hand Man* for individuals and groups is its ability to transfer information from one module to another, to your foreground program file, to your modem, or to your printer. For instance, if you have to write a report or proposal, you can create an outline listing the major points in *Right Hand Man's* Notepad module. Then, while using your word processor to write the document, you can pop up the notepad in a win-

dow and refer back to the outline. With just a few keystrokes, any text in the Notepad can be brought directly into your article.

## IT ALL ADDS UP

*Right Hand Man* contains a selection of calculators, including a business calculator, a programmer's calculator, and a scientific calculator. The default business calculator goes up to 17 digits and has a memory, as well as an attractive simulated paper-tape-display option. The programmers' calculator performs logical functions of AND, OR, and XOR and allows base number changes (the default is 10). The scientific calculator calculates square roots, logarithms, sine, cosine, tangent, and exponents. Of course, all information garnered from these sources is accessible to and transferable within a group.

GOOD TIMING: HOW WORKGROUP SOFTWARE MANAGES SCHEDULES\* CONTINUED

**Group Scheduler** - Wednesday, June 15, 1989 2:00 pm

See How You Feel This Day Out

June 1989		Event Info
4	5	Event name: Planning Meeting
11	12	Authority: Frank
18	19	Organizer: DAVE
25	26	Event date: June 15, 1989 2:00 pm
		Event length: 1 hour
		Conflicts: None
		User Status: Pending
		Resource Status: OK
		Date created: June 15, 1989 2:00 pm

July 1989

July 1989		Event Info
2	3	2:00pm Appt. from Calendar
9	10	2:00pm Planning Meeting
16	17	2:00pm
23	24	2:00pm
30	31	2:00pm

1 Resources: 2 Users: 3 Accept: 4 Reject: 5 Delete: 6 Reschedule: 0

Syzygy is scheduling software with a definite project-management flavor. Though it does not include electronic mail, its ability to use MHS to transfer files makes it particularly useful.

**Tandy Workgroup Companion** - Wednesday, June 15, 1989 2:00 pm

Phone Book

Bill	407
Frank	407
Keith	407
machine 1	407
machine 2	407
pat	407
randy	407

View Gantt

Tandy Workgroup Companion, which runs in conjunction with Tandy Corp.'s popular DeskMate package, includes this group calendar, which you can use to find the best time to schedule a meeting.

The screens of the *WordPerfect Office Scheduler* and *Calendar* modules interact, allowing the Scheduler to find free time on individuals' calendars and the Calendar to show meetings created by the Scheduler. Here, the details of a scheduled meeting are shown in the center window.

**WordPerfect Office Scheduler** - Wednesday, June 15, 1989 2:00 pm

See How You Feel This Day Out

June 1989		Event Info
4	5	Event name: Planning Meeting
11	12	Authority: Frank
18	19	Organizer: DAVE
25	26	Event date: June 15, 1989 2:00 pm
		Event length: 1 hour
		Conflicts: None
		User Status: Pending
		Resource Status: OK
		Date created: June 15, 1989 2:00 pm

July 1989

July 1989		Event Info
2	3	2:00pm Appt. from Calendar
9	10	2:00pm Planning Meeting
16	17	2:00pm
23	24	2:00pm
30	31	2:00pm

1 Resources: 2 Users: 3 Accept: 4 Reject: 5 Delete: 6 Reschedule: 0

LAN APPLICATION SOFTWARE  
WORKGROUP COMPUTING

## Shoebbox 3

by Patricia A. McGovern

In addition, four new modules have been included for both individual and group use in this version. Anyone who needs additional organizational aids will appreciate *Right Hand Man's* to-do list, which helps you structure your tasks and set priorities. When the task is completed, it or the entire list can be deleted or saved in an archive.

The *Right Hand Man* File Manager allows you to reference the hard disk menu for files without leaving an application, as well as perform many DOS-file operations without leaving your file or foreground program. The File Transfer module is a simple communications program with the capability to transfer non-ASCII files using the Xmodem file-transfer protocol. You can use it to connect to any bulletin board or communications system and to

*Shoebbox 3*, from R&R Associates, is no-frills groupware at a bargain price. While it may not offer the high-end features of some other packages, the \$350 software (plus \$10-per-workstation license fee) has in its favor carefree installation, ease of use, and flexibility.

System administrators (called "coordinators" in the documentation) will find getting the system up and running to be a simple procedure. Just copy the files into a subdirectory of the server's hard disk. Although you can assign only one coordinator if you choose, the software allows up to 64 coordinators per network. Each coordinator can assign hotkeys for certain tasks and give users a security password.

Users will find maneuvering through the program to be a relatively painless task. The initial screen displays a text list of the current day's appointments and an easy two-line menu helper. The menu commands are easily accessed by pressing the appropriate letter key. Constant on-line help is available, but because of the simplicity of the package I doubt you'll ever need it.

### WHAT'S INSIDE

The three main components of *Shoebbox* are reminders, appointments, and expenses; the one main problem is that none of these features is RAM resident.

The Reminder feature is basically a to-do list and will help you keep track of and prioritize your tasks. You can attach notes to each reminder you schedule, but they can be only 10 lines long, with 65 characters per line. It would be more useful if you could attach a longer note to the reminder you've scheduled. An asterisk beside a Reminder shows an event past the due date you've assigned to it.

In using Reminder, you can note when tasks aren't completed and mark them off when they are accomplished. The Reminder feature links to *Shoebbox's* History feature. Using History, you can keep a running record of every task listed in the reminder area. History spans 2 years onward from either the last purged date or the current date; this handy little feature can quickly produce reports of all the important things you've done in the past. Using

wildcards or date limits, you can be more selective in listing historical events.

Using the Appointments feature of *Shoebbox*, you can set up appointments, put in events, and even target dates for pending (unconfirmed) appointments. Scheduling appointments is not as sophisticated as it is in some of the other programs—you can make an appointment for yourself and copy it to other users, who will then let you know how it fits into their time schedules. You can attach notes to each appointment, but as with the Reminder feature, the length of each note is limited. The Appointments feature ties in with the History feature in the same way as the Reminder function.

You'll find the most prominent display of the program's flexibility in its Expense feature. Each group coordinator can create unique expense items, categories, and account numbers according to his group's needs. This way, the expense items for the sales staff can be unlike those of the research staff; for instance, the sales staff may be assigned a travel expense category that is not available to the research department. Features like this show how this package can be appealing to a company whose needs are a bit out of the ordinary—it enables you to expand on ordinary expense categories, which is not possible in some of the other programs.

There's one problem with the expense feature, though—to view the grand totals of an expense report, you must exit out of

**Because Shoebbox is  
so simple, you  
probably won't need  
its on-line help.**

the menu you are in and go to another one. A suggestion for future revisions: put the cumulative totals on the same screen.

### SECURITY AND SUPPORT CONCERNS

*Shoebbox's* abilities seem to emphasize that this product will work well in a large office, but it's less than well implemented security system runs counter to multiuser access. A breach of security is created by the file named SBADMIN—anyone who knows how to view DOS files can simply



**FACT FILE**  
**EDITOR'S CHOICE**

**Right Hand Man, Version 4.20**  
FutureSoft Inc., 1331 N. I-10 Service Rd., #401, Metairie, LA 70002; (800) 327-8296, (504) 837-1554  
List Price: Single-user system, \$169; 5-user system, \$495; 10-user system, \$899; 25-user system, \$1,875; 50-user system, \$3,500; 100-user system, \$6,500.  
Requires: 52K RAM, DOS 2.1 or later  
In Short: A RAM-resident program that makes scheduling appointments for workgroup members and transferring information stored in *Right Hand Man* files to other applications a simple pop-up procedure. Nice extras include a file manager for referencing the hard disk and a file-transfer module that lets you exchange non-ASCII files using the X-Modem transfer protocol



CIRCLE 543 ON READER SERVICE CARD

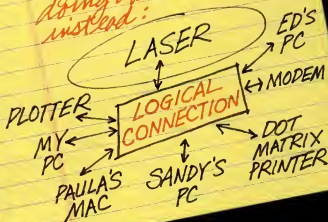
exchange files with any communications program capable of Xmodem transfers.

*Right Hand Man* also includes a Chat capability that allows people to carry on real-time, open-forum conversations over the network. Chat can reduce the number of face-to-face meetings your staff needs and limit disruption during the workday. *Right Hand Man* uses either Novell's IPX or the more generally available NetBIOS to carry chat messages.

*Right Hand Man* proves true to its name—as a TSR, it pops up when you need it, and you can count on it for help, especially when it comes to transferring information, setting work priorities, and organizing group meetings.



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## LAN APPLICATION SOFTWARE WORKGROUP COMPUTING


**FACT FILE**



**Shoebox 3, Version 2.2**  
R + R Associates Inc.,  
39 Canwell Ave., Mount  
Vernon, NY 10552;  
(914) 668-4057.  
List Price: \$350 plus  
\$10-per-workstation  
license fee.

**Requires:** 198K RAM, DOS 3.1 or later.  
**In Short:** Shoebox provides an inexpensive way for people on a network to file, sort, and retrieve information about appointments, reminders, and expenses. A good product for small organizations in which people value flexibility in their software and trust one another.

**CIRCLE 544 ON READER SERVICE CARD**

execute this file and take a look at all the user names and passwords stored here.

One of the program's manuals states that users will be able to get support from the *Shoebox* customer hotline between the hours of 9 a.m. and 5 p.m., eastern standard time. However, our experience is that most calls result in your being connected to an answering service. While *Shoebox* is generally easy to use, you might find it hard to get answers to any questions you might have.

*Shoebox* allows you wide flexibility in how you use its features—that's either a curse or a blessing, depending on how structured you like your software. For a group with unique requirements and imaginative coordinators, this package can fit your needs at a good price. Keep in mind, though, that its poor security features may make it a poor choice for larger organizations.

## Szygy

by M. Keith Thompson

*Szygy*, from Information Research, is a different kind of animal from the other groupware packages reviewed here. It focuses on furnishing managers with the tools necessary for scheduling, coordinating, and tracking workgroup projects. Priced at \$1,295 for the ten-user version, *Szygy* includes a Hierarchical Activity List, multilevel project-management-style Gantt charts, a calendar, a to-do list, and an interface to MHS allowing the package to send files to any MHS-compatible e-mail system. The designers of *Szygy*

based its structure on the idea that activities stem from "objectives"; objectives are accomplished by creating, assigning, and completing projects. Each "project" breaks down into many different "tasks." The information in these three categories—objectives, projects, and tasks—comprises a "workbase."

For example, let's say that your company's objective is to become the largest software developer in the United States. The projects involved in reaching this goal are (a) assembling a Class-A team of programmers, (b) hiring top marketing gurus, and (c) designing the "killer" application. The tasks assigned to projects a and b would be similar: hire headhunters to find top programmers and marketing types, and then interview the prospective candidates. A task for project c might involve surveying users to determine the as-yet-unvented dream application. All of these things together form a workbase of data critical to becoming the U.S.'s largest software developer. Other objectives would require that you create separate workbases.

The scheduling approach of *Szygy* works well if users take the time and effort to keep their project scheduler current. But a scheduler has to be convenient—or specifically demanded by your superior—to use. *Szygy*'s calendar isn't TSR, and stopping everything else to call up a program and update information isn't the way people work.

The calendar schedules only projects and does not allow scheduling of appointments or meetings involving many people or resources.

### EASE AND FLEXIBILITY

*Szygy* has in its favor a simple and effective user interface. The program displays information on-screen in attractive windows and relies on easy-to-use key combinations for navigation. The command each function key represents is shown on the bottom of the screen; when you hold down the Shift, Alt, or Ctrl keys, *Szygy* redisplay how that key changes the function key's definition.


Information Research decided not to reinvent the wheel and write its own electronic-mail program. *Szygy* has an interface to MHS to communicate to a wide variety of e-mail services, as well as the ability to read *Da Vinci E-Mail* mailboxes directly.


You can send copies of *Szygy*'s reports

and charts to other people through the program's tie to MHS, but the program doesn't provide the full mail-handling capabilities present in a typical electronic-mail package, such as replying to and forwarding messages. If you don't have MHS support, you can insert *Szygy*'s ASCII files into messages you create with the e-mail program of your choice.

In some sections of the program, *Szygy* has the ability to analyze your actions and fill in the blanks accordingly. For example, when you create a mail message for MHS, *Szygy* fills in the "Re:" field with the name of the currently selected work item and/or sends a copy of the message to the users who have been assigned to complete that task.

*Szygy* does offer many preformatted reports and a complete report-writing program for creating custom reports. The report writer allows flexible selecting of workbase data for creating specific reports. Gantt charts show the big picture


**FACT FILE**



**Szygy, Version 3.1**  
Information Research,  
2421 Ivy Rd.,  
Charlottesville, VA  
22901; (800) 368-3542;  
(804) 979-8191.  
List Price: Single-user  
system, \$395; 10-user  
system, \$1,295; 25-user  
system, \$1,995; unlimited users per server,  
\$2,995.  
**Requires:** 512K RAM, DOS 3.1 or later.  
**In Short:** *Szygy* is a different kind of groupware package: it combines aspects of project management with workgroup scheduling, emphasizing the former. A simple user interface, multilevel Gantt charts, preformatted reports, and a complete report-writing program add to its usefulness.

**CIRCLE 548 ON READER SERVICE CARD**

graphically for a quick understanding of a mass of data.

There are some important features of workgroup productivity software that Information Research did not include in *Szygy*. For instance, the *Szygy* phone book is good only for looking up numbers; you can't just select a name and expect the program to dial the number for you.

*Szygy* stands apart from the other workgroup programs we tested, and it's obviously not for everyone. But if your concept of group scheduling is help in coordinating projects rather than just getting people together for diverse meetings, this program may prove a good choice.

Tandy Workgroup  
Companion

by Patricia A. McGovern

Everyone who owns a Tandy 1000 PC is familiar with the company's *Professional DeskMate* personal productivity package, a collection of programs that helps users get organized and replaces mounds of manually produced Post-it notes. *Tandy Workgroup Companion* is a \$149.95 enhancement that works in conjunction with *DeskMate*; it can run over RS-232 connections, Tandy Link interface cards, or 3Com EtherLink networks.

*Workgroup Companion* enhances *DeskMate*'s own features, such as the address book and calendar, while adding new workgroup-oriented functions like Central, Forum, Talk, Host, and Mail. The Workgroup Setup function allows the network administrator to choose the communication parameters and other options for the workgroup. During setup, users can be given the ability to converse with members of other workgroups, in addition to their own.

The *DeskMate/Workgroup Companion* interface lets you use a mouse, function keys, or the Arrow-and-Enter method. Some quick-keys would be appreciated in future revisions. The interface is not very professional—rather than assigning all the options a place in the pull-down menu choices at the top of the screen, some of the features are accessed through squares that take up all the space of the main-menu screen.

## FAMILIAR FACES, NEW FEATURES

If you are accustomed to *DeskMate*, you'll find the program's Address Book and Calendar familiar features. The main difference is that both now have private and shared user options. The Calendar allows others to see your schedule, but not the actual event booked. (In order to access another user's calendar, you must know that user's password.)

Meetings can be set up using the new Central feature. *Workgroup Companion*'s Central is a program emulating a "message headquarters," allowing the users of the workgroup to confer on schedules and share items of mutual interest. You can send or receive messages from anyone in your workgroup and save those messages for future reference. Central assumes you

are conscientious enough to sign into the system when you're available for messages and to sign out of it when you are not. If you don't sign out and you leave for lunch with your system on, someone could go in and read everything noted there.

However, the security password feature the designers included in the shared calendar is not a feature in Central. This can be a problem if you want to set up a meeting but don't want everyone else in the workgroup to know about it. If that's the case, *Workgroup Companion* also sports an e-mail feature for users on the LAN. Even then, though, you must be sure that you take the option of securing your mail access by password.

Mail alerts you when the postman arrives and also allows you to tag on a corresponding file in outgoing messages. The file must be created in *DeskMate* or in ASCII format. Mail grants flexibility in merging messages, moving parts or all of the messages, and printing a list of selected messages.

## OTHER MEANS OF COMMUNICATION

The Forum program is a computerized bulletin board that acts like a think tank for the workgroup members. Forum can also be a tool for producing group manuscripts and other work. It allows you to search for specific thoughts or action items from other users' inputs via keywords. While it allows only the author of a Forum article to edit an item, topic, or reply, it isn't password protected, so anyone can sign in as someone else.

Talk is a *Workgroup Companion* accessory that lets you chat in real time with an-

other person on the LAN without leaving your desk. To receive a call, a user must not be talking with anyone else. Once the call is placed, the screen splits in two, with the receiver's conversation shown on top and the sender's words on the bottom. One of the features missing is the ability to save those conversations or import them into the Forum for later reference. It would also be nice if more than two people could hold a real-time conversation.

If you need to get vital information from your PC while you're away from it, the Host program functions as your home away from home for easy access to your office or home computer through a mo-

**The DeskMate/  
Workgroup  
Companion interface  
lets you use a mouse,  
function keys, or the  
Arrow-and-Enter  
method. Some quick-  
keys would be nice.**

dem. Before you go on the road, designate the PC at your home or office to be the host computer. All you're required to do is remember to leave the host system on and not in use; passwords are recommended but not mandatory. Even though *Workgroup Companion* isn't loaded on the laptop you're taking on the road, all its functions (except for the graphical interface) are available from the DOS prompt.

For offices running 3Com's 3+, Tandy has a version of *Workgroup Companion* with 3+ support. In this network environment, 3+ manages shared directories, access rights, and printing jobs.

*Workgroup Companion* contains a wide variety of means to communicate with other users on the LAN, but better security provisions would be welcome. *DeskMate* devotees will probably find it a comfortable addition, but users who are really interested in groupware that does a Class-A job at scheduling might prefer to look elsewhere.


**FACT FILE**

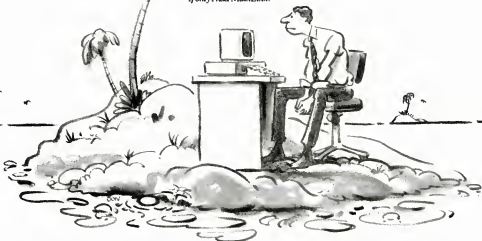


**Tandy Workgroup Companion, Version 1.0**  
 Tandy Corp., 1800 One Tandy Center, FL  
 Worth, TX 76102; (817) 390-3700.  
 List Price: \$149.95  
 Requires: 640K RAM;  
 DeskMate, Version 3; DOS 3.2 or later  
 In Short: *Workgroup Companion* is easy to set up and use. *DeskMate* fans will appreciate it for its familiarity. While it offers the same basic group-productivity functions as most other packages, group scheduling is not one of its strongest features.

CIRCLE 548 ON READER SERVICE CARD

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Research, Inc.

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CIRCLE 191 ON READER SERVICE CARD

## WordPerfect Office

by M. Keith Thompson

*WordPerfect Office*, from WordPerfect Corp., is an enhanced variation on the company's *WordPerfect Library* software. The package includes *Library* functions such as a DOS menu manager, calendar, notebook, file manager, calculator, macro editor, and DOS text editor; it also adds network support, a group-scheduling module, and LAN e-mail. This \$495-per-server package (station modules are \$150 each), gives LAN users an easy and effective way to coordinate efforts.

When setting up the software, the network administrator must take special care to create the proper search paths and hide five files in a protected directory. The administrator must also add each user's network and mail IDs to the file called USER.ID.FIL for use in e-mail and scheduling. The explanations in the System Manager's Guide are useful, but we still ran into problems with filenames and locations. Once everything is up and running, though, the

**WordPerfect Office's  
notebook is  
actually a simple  
flat-file database.**

software performs admirably, allowing the user to access all applications by selecting the appropriate character from a menu.

Shell is a DOS menu and memory manager—you can run your *WordPerfect Office* programs, as well as your other applications, from here. Shell makes it easy for users to move between the various *WordPerfect Office* applications. Because *Office* supports the LIM EMS specification and virtual memory, each program in *WordPerfect Office* can remain resident while another program runs.

For example, suppose you are in *Lotus 1-2-3* when a colleague calls to see if you are free for lunch next Wednesday. Instead of saving your worksheet, exiting *1-2-3*, and waiting to load *Calendar*, you can use the "Go to DOS" feature of *1-2-3* to get to the DOS shell, switch to *Calendar*, make

the appointment, and then switch back to *1-2-3*. Shell accomplishes this by quickly swapping *1-2-3* to EMS memory or disk, loading *Calendar*, and then swapping *1-2-3* back to real memory.

Other Shell features include a clipboard utility permitting the exchange of data from one program to another. It also offers macros for automating keystrokes, as well as mnemonic menu commands.

### ORGANIZING YOUR TIME

*WordPerfect Office's* Scheduler uses features from the *Calendar* program to coordinate appointments. You simply enter the names of the people, resources, and amount of time needed. Scheduler examines the calendars of the users involved before displaying open and conflicting times for the meeting. When the meeting time is set, the Scheduler adds the meeting to the calendars of those scheduled to attend and requests confirmation. If an appointment is rescheduled, Scheduler notifies the attendees of the changes.

One unlikable aspect of the design is the program's insistence that each resource have someone responsible for it; in addition, these managers must attend to each resource separately. Worst of all, Scheduler does not alert managers when someone asks for one of their resources; it just assumes that each resource manager will keep checking for requests.

Of course, no scheduling program is effective if users don't keep their calendars updated. *Office* is quick and simple enough to operate to prevent this from becoming a problem. Among the calendar's features is its ability to display up to 8 weeks at a time. *Calendar* allows flexible time/line entries (every 5 minutes, 30 minutes, or whatever you prefer) and will keep track of daily appointments, set alarms, and maintain a to-do list. If you do not complete all of the items on the to-do list on the assigned day, *Calendar* automatically carries them forward to the next day's list. It also has a 255-character memo field to make notes for each day.

In addition, one limitation of the older single-user *WordPerfect Library* calendar is now cured. In the previous version of the calendar, if you wanted to schedule yourself for a staff meeting every Monday morning, you had to make each entry separately. Now, an auto-date schedule feature lets you use any formula imaginable—for example, "Highlight every Monday that

does not fall on the 23rd of a month."

Flexible printing options allow you to print any combination of a calendar, memo, or to-do lists for any day, week, or year. This allows you to share part of your schedule with other users.

### NOT NECESSARILY A NOTEBOOK

*Office's* notebook is actually a simple flat-file database in which you can store names, addresses, and the like. It can be considered a multiuser function, but only in the sense that you can read from a file



**FACT FILE**

**WordPerfect Office,  
Version 2.0**  
WordPerfect Corp.,  
1555 N. Technology  
Way, Orem, UT 84057;  
(801) 225-5000.  
List Price: First user,  
\$495; each additional  
user, \$150; upgrade  
from *WordPerfect Library* package to workstation  
version of *WordPerfect Office*, \$40.  
Requires: 384K RAM, DOS 3.0 or later.  
In Short: *WordPerfect Office* isn't easy to install,  
but the Scheduler and Shell programs are well  
done. Useful features include flexible printing  
options and utilities like a flat-file database,  
calculator, file manager, macro editor, and  
program editor, but the lack of gateways to e-mail  
systems may deter large organizations.

CIRCLE 547 ON READER SERVICE CARD



that is currently open. The biggest drawback of the notebook is that it doesn't present a directory of its files. You have to remember the name of each file when you want to retrieve it.

Other utilities included in the *Office* package are a calculator, file manager, macro editor, and program editor. The calculator includes the usual financial, programmer, statistical, and scientific modes. File Manager allows for file locking and for searching text files for words; it also has the handy ability to search your hard disk for files. Macro Editor lets you change or create macros for all *WordPerfect* programs, and the Program Editor includes most of the editing features of *WordPerfect 4.2*.

*WordPerfect Office's* e-mail package is useful, although it lacks the added extras some other packages incorporate, such as MHS support. It lets you attach binary files, forward messages, establish mailing lists, and easily reply to incoming mail. If you need it, Mail displays a list of user names and lets you quickly mark the addressees. Also included as a welcome ex-



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## EDITOR'S CHOICE

- Higgins
- Right Hand Man

*Higgins* is a rock-solid package delivering great performance every time. The program is powerful, versatile, and friendly. It's not cheap, and you'll pay extra for special options, but the power and reliability are there.

*Higgins* handles the basic workgroup tasks of scheduling and time management very nicely. Its electronic mail is on a par with the programs that do only e-mail for a living. This combination makes it a leading choice for overall most valuable player in the group productivity league. The biggest improvement *Higgins* needs: TSR implementation of its calendar.

*Right Hand Man* is a newer package that has the widest variety of features and is the most promising up and comer in the category. Its shared telephone directory features, notepads, communications capabilities, scheduling utility, and other features are all wrapped in one small and compact package. Best of all, the program runs completely TSR, making it convenient to use. All it needs are more links to different mail systems.

tra is a phone-message form for quick notification of calls.

*WordPerfect Office* meets the needs of many work groups, but it isn't perfect; its setup procedures could do with an overhaul, and gateways to e-mail services would be welcome. In general, though, people who already use *WordPerfect* products will embrace *Office's* familiarity, and those who don't may find that learning it is worth the effort.

Patricia A. McGovern worked as a systems analyst for Harris-Lanier in Europe. She is currently a partner in a desktop publishing service business. M. Keith Thompson is the inventor of the AT TurboSwitch and the founder of Megahertz Corp. He is a frequent contributor to PC Magazine. Pamela Watson is a free-lance writer whose computer experience dates back to the early days of CP/M.

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## LAN E-MAIL:

Spreading  
the Network  
News

PHOTO ILLUSTRATION: JAMES NAZZ

**At just \$30 per node, an efficient electronic-mail system is one of the fastest ways to make your LAN pay for itself. PC LAN Labs outlines the features of eight LAN e-mail packages.**

*by Frank J. Derfler, Jr.*

The merits of electronic-mail systems are many: not only do they serve as an efficient means for making decisions and exchanging information, but they also reduce frustration by eliminating telephone tag and improve productivity by permitting far-flung staffs to ignore time zones and varying office hours. With the benefits of general e-mail services so obvious, it shouldn't come as a surprise that installing an e-mail system on your LAN will prove a low-risk and high-payoff investment. There are e-mail systems for LANs of every size and function, and they offer economical and efficient ways to exchange and transmit information inside and outside an organization.

Some network operating systems, like DCA's *IONET* and Torus's *Tapestry*, include electronic-mail packages that work well within a homogeneous network of PCs—no "foreign" machines, operating systems, or mail systems allowed. Banyan Systems and 3Com Corp. market more-robust e-mail packages that are tightly integrated with their network operating systems and can toler-

ate a variety of PCs. If your e-mail requirements are simple, built-in packages like these may do the job. But if you want to mix PCs with bigger DEC or IBM computers, access services like MCI Mail, ensure high security for messages and files, or create special services like bulletin boards, you will probably need to purchase a third-party add-on e-mail package.

The products in this review are single-purpose e-mail packages that run on Novell's *NerWare* and NetBIOS-compatible operating systems like 3Com's *3+Open LAN Manager*. To learn about products that include e-mail as an adjunct to scheduling and other functions, see "Imposing Efficiency: Workgroup Productivity Software" in this issue. Some of those workgroup productivity packages give you excellent mail service, but the eight programs reviewed here are the most robust and rich in features. One major exception is Enable Software's *Higgins* (Conetic Systems), which produces *Higgins*, was acquired by Enable), which, though primarily a groupware program with scheduling capabilities, has an e-mail system that

competes successfully with these special-purpose mail packages.

The LAN e-mail market is competitive and dynamic. The leading products, *cc:Mail* and *The Network Courier*, run a neck-and-neck race in terms of features and flexibility. *Da Vinci eMail*, which began life under *Windows*, is now also running on the DOS track and performing with the leaders. At an average price of about \$30 per node, you almost can't afford not to install one of these useful and flexible packages on your network.

#### SEE HOW THEY RUN

Modern LAN e-mail packages run with almost any network operating system, and if NetBIOS is available they don't care what kinds of network interface cards are in the LAN. These mail systems establish shared subdirectories on the server and transfer the files representing messages and attachments using DOS read and write commands. Some systems, *The Network Courier*, for example, use NetBIOS or IPX

network services to communicate quickly and efficiently between nodes for incoming message notification.

In addition, these systems are becoming more adept at working with various operating systems. The DOS version of TOPS's *InBox* is coming over from the Macintosh arena. (It was unavailable when we did our hands-on reviews, but it should be on the market this fall.) If you connect PCs and Macs with mutually compatible network cable systems like Ethernet or Token-Ring, the systems can exchange mail using *InBox*. A growing number of products are also compatible with OS/2, including *Da Vinci eMail*, *cc:Mail*, and *The Network Courier*.

#### STRIVING FOR DIFFERENCES

The basic functions of electronic mail (create, read, forward, reply, receipt, and priority) were defined years ago. In such a market, LAN e-mail products have to furnish additional services to call attention to themselves.

These enhancements include the ability to send encrypted messages, attach binary

## THE X.400 FACTOR

by Frank J. Derfler, Jr., and  
Pamela Milland

Electronic mail is well entrenched in most corporations today, but what about the problem of dealing with conflicting e-mail systems? Today's companies have different networks, different software, LANs connected to mainframes, minis connected to PCs, and departments on one network wanting to communicate with departments on another network. Is e-mail communication possible in such disparate environments?

One proposed solution is X.400, the international communication protocol standardized by CCITT (translated from the French for the *International Telegraph and Telephone Consultative Committee*) in 1984. Basically, X.400 is a set of rules governing how all electronic mail should be configured. If all e-mail systems used X.400, they would have the same types of mail messages, user-naming methods, access control, etc. So they would all be able to communicate, right? Well, yes and no.

An X.25 network is a necessary in-

gradient for adherence to the X.400 standard. Examples of X.25 packet-switching networks include Telenet, Tymnet, and AT&T's Accunet; moreover, some companies even invest in their own X.25 networks. An X.25 network must conform to standards as to how packets are transmitted, how error correction is implemented, what the actual packet looks like, and other conventions. This means LAN e-mail users need a gateway to an X.25 network, such as the one from Eicon Corp., but this adds to the complexity and cost of X.400 installations.

#### CALLING NEW PRODUCTS

Like IBM's Systems Application Architecture (SAA), X.400 is a standard requiring implementation through new products. As more X.400 products emerge, companies will find ways to conform to the higher-level X.400 standards while using other low-level protocols, including Ethernet and the IEEE 802.3 series of LAN interface descriptions, combined with midlevel protocols like TCP/IP to carry the mail. But

until that happens, X.400 is not likely to carry a large share of the growing PC-based LAN market. Beyond even X.400 is X.500, another protocol that promises worldwide compatibility and true 21st-century universality.

A recent development for LAN e-mail that users might want to keep an eye on is the X.400 Application Program Interface Committee, whose 11 members include DEC, Lotus Development Corp., Retix, Sun Microsystems, Telenet, and 3Com Corp. This organization was formed to develop a standard interface between e-mail systems, gateways, servers, and networks. With a standard API, the operating system over which the e-mail is running becomes secondary. Though the work of the committee diligently continues, it's probably going to be quite a while before the transportation of LAN e-mail messages onto public services like MCI Mail or EasyLink is effortless. ■

*Frank J. Derfler, Jr., is workgroup systems editor of PC Magazine. Pamela Milland is a PC Labs project leader.*

files, and exchange messages with dissimilar mail systems. Some programs have the ability to set up special-interest bulletin boards where users can post messages relating to a particular topic. On the lighter side, some let you choose the musical tune that plays through your speaker when new mail arrives.

Some of these packages let you run either the whole program or its new-message-notification module as a TSR. The latter option is fine for people who primarily want to monitor incoming mail. In order to reply to mail, though, they'll have to quit their application and run the full e-mail package. Heavy mail users who load the whole package as a TSR will lose about 50K of memory.

Since LAN redirection and driver software can take an additional 50K, the total RAM lost to the LAN and e-mail service can be significant. *cc:Mail* and other companies include an Unload command for their TSRs, but usually these commands won't work unless the TSR was the last one loaded. At PC LAN Labs, we use memory-management programs like the

\$49.95 *PopDrop* from Bloc Publishing (800 SW 37th Ave., #765, Coral Gables, FL 33134; (800) 888-2562) to unload TSRs selectively.

#### THE FAX OPTION

Connection with fax boards is another new e-mail wrinkle. With an e-mail-to-fax interface, you can create multiple address messages that go to local addressees on e-mail, to people on other electronic systems through gateways, and to people without e-mail systems through fax. The mail is routed through a mailing list that you set up. For example, *Higgins* offers a \$995 add-on module called *Higgins To: FAX* that interfaces with the Intel Connection CoProcessor. This product sends facsimile copies of outgoing electronic mail, using the CoProcessor's modem for data exchanges with other CoProcessor-equipped machines.

The major drawback of these e-mail-to-fax systems is the same one plaguing standalone PC-to-fax systems: poor ability

to receive incoming mail. Incoming fax messages are saved as graphic images, and reproducing them requires a laser printer with a lot of memory.

#### MIXED MATCHES

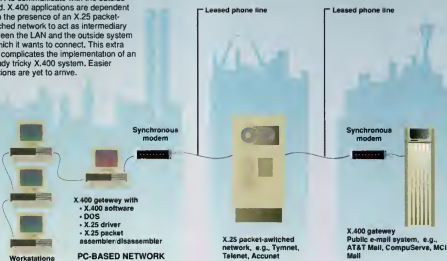
People in an increasing number of organizations find that they need to connect their PC-based LAN e-mail systems to similar LANs in distant locations, to other mail systems on minicomputers and mainframes, and to public e-mail services. Fortunately, the leading e-mail products now support industry and international standards that make it possible, if far from simple, to connect dissimilar mail systems.

Making connections between identical networks in separate locations requires dedicating a computer to the job. The modern-equipped computer runs a separate program with a script telling it when and how to dial other similarly equipped machines in different locations. The machines call each other and exchange the appropriate messages held in each system. Various software packages use different routines to determine when and if they call



## HOW X.400 CONNECTS YOU WITH THE WORLD

By itself, an X.400 gateway does not allow a LAN to communicate with the outside world. X.400 applications are dependent upon the presence of an X.25 packet-switched network to act as intermediary between the LAN and the outside system to which it wants to connect. This extra step complicates the implementation of an already tricky X.400 system. Easier solutions are yet to arrive.





and how to handle busy signals and other problems.

Some e-mail software packages include a facility that allows incoming callers with a computer to use the network electronic-mail system as if they were local. These packages vary in how they work, but most of them put a working copy of the software on the calling machine—a laptop, for example—that dials the host machine on the LAN. The software will quickly transfer incoming and outgoing messages, including attached non-ASCII files. The calling

**When selecting an e-mail system for your LAN, look for the one that best meets your growth needs.**

machine doesn't have full LAN services, just fast and efficient e-mail exchange.

The process of establishing a gateway to dissimilar mail systems, like those unique to larger-scale hardware from IBM or DEC, is easy to understand but takes careful attention to detail to perform. As with the LAN-to-LAN connection, a separate machine on the network, called the *mail gateway*, runs special software that gets the job done. The machine acting as the mail gateway communicates with the non-PC mail system and needs special adapters for some connections, such as those for IBM's SNA.

Because the e-mail systems on incompatible platforms are so different, the LAN e-mail gateway software has to translate mail formats, recognize addressees, and perform administrative tasks like making password exchanges and confirmations. There are dozens of communications parameters, access strings, account codes, and other variables, so setting up one of these systems takes the time, patience, and cooperation of everyone involved.

The good news about connecting dissimilar mail systems is that in early 1989, companies began delivering an increasing number of products conforming either to standards adopted by major vendors or to international standards. The most widely supported industry standard is called MHS

(Mail Handling Service). These standards are not competitive or mutually exclusive, and once software being developed by Novell and British Telecom is in place, LAN application programs that talk to MHS will relay messages to X.400 systems (for more on X.400, see the sidebar "The X.400 Factor").

MHS was developed by Action Technologies, the people who market *The Coordinator*. They sell a DOS version of MHS for \$100, but Novell makes MHS available at no cost to any owner of *NetWare* who sends in the postcard that comes in the *NetWare* package.

It's easy to understand MHS if you think of it as a communication program that runs on a PC and controls its serial ports while using extensive scripts and moving data in and out of shared files. MHS shares files with application programs such as *Da Vinci eMail*, *cc:Mail*, *Higgins*, and *Ashton-Tate's Framework III* integrated package. These applications use MHS to connect with distant homogeneous LANs and as a gateway to dissimilar mail systems.

While MHS can connect homogeneous LANs over telephone lines, its real value comes in the MHS gateway interfaces that are available for IBM, DEC, and a growing number of other electronic mail systems, including the public carriers. Neither Action Technologies nor Novell sells those gateways. They come from other companies that specialize in understanding the intricate actions needed to link dissimilar mail systems.

On-Site Information Systems (14755 Ventura Blvd., #1914, Sherman Oaks, CA 91403; (818) 905-6200) markets an MCI Mail gateway for MHS that it sells in a five-user version for \$595. Alcom (2464 Embarcadero Way, Palo Alto, CA 94303; (415) 493-3800) sells an MHS product that links MHS to a wide variety of services including MCI Mail, Western Union's Easylink, and telex. The basic Alcom LAN-FAX product sells for \$1,495, and add-on gateways are at an additional cost. The MCI Mail gateway, for example, is \$795.

Any package that addresses MHS can link to DEC's All-In-1, VMSMail, MCI Mail, IBM's PROFS, Wang Office, and other services via Soft-Switch, an on-line computer service (Soft-Switch, 955 Chesterbrook Blvd. Wayne PA; (215) 640-9600). Subscribers use the MHS protocol to send mail to Soft-Switch, which then

translates and resends the mail to the destination system specified.

The major drawback to MHS is its one-modem-per-machine configuration. We recently tested a number of LAN asynchronous communications servers ("Building Workgroup Solutions: Asynchronous Communications Servers," *PC Magazine*, May 16, 1989), and we know that one machine can efficiently carry from 4 to 16 simultaneous connections with multiple modems. When we spoke with people at Action Technologies, they pointed to the reliability that comes from installing redundant PC/modem systems (many PCs with one modem each) on a LAN. We intend to install a permanent MHS node in the PC LAN Labs but will use one of the several good multitasking operating systems for DOS to create multiple sessions in one computer with multiple modems.

#### SIMPLICITY TO COMPLEXITY

When it comes to selecting an e-mail system for your LAN, you should look for the one that will best meet your growth needs. If using MHS to connect with distant homogeneous LANs and as a gateway to dissimilar mail systems is going to be important in your organization, make sure the product supports this protocol. Likewise, be attentive to whether the program can set up bulletin boards and implement security features, and investigate its potential for integration with other software.

*Frank J. Derfler, Jr., is workgroup systems editor of PC Magazine.*

## cc:Mail

by Mike Byrd

When it comes to LAN e-mail packages, Version 3 of *cc:Mail* hits the mark in terms of power and friendliness. The basic \$695 package (configured for 25 local mailboxes) enables PC users to easily exchange messages, as well as graphics and text files, over a LAN.

The *cc:Mail* package uses a shared hard disk on your file server as a mail pickup and distribution center (post office). All mail goes to the post office and stays there until it is picked up by its intended recipient(s). The program runs on any PC-based LAN software and hardware combination.

*cc:Mail* is a snap to install and use. Earlier versions of the package were not mem-

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## LAN APPLICATION SOFTWARE

## E-MAIL SYSTEMS

ory resident, but you now have the option of running three RAM-resident pop-up programs: NOTIFY (about 11K) alerts the user to new mail; MESSENGR (80K) allows you to send and receive mail without leaving an application; and SNAPSHOT (28K) captures both text and graphics screen images. A fourth program, MAIL, runs as a full, standalone application and offers the most flexibility.

However you choose to run *cc:Mail*, the documentation and on-board help menus are almost superfluous. The menu format limits selectable functions to those related to your current activity; the most likely choice is highlighted first. The F1 key brings up more-detailed explanations of functions than almost anyone will ever need. The package takes you by the hand from installation to user operation.

## GETTING YOUR MESSAGE ACROSS

Included with the package are an easy-to-use, built-in word processor and graphics editor. The word processor sports a highlighter for text annotation, and a full-screen help menu is only a keystroke away. The graphics editor can produce a graphics display from scratch or modify an imported screen-capture image (for example, files in TIFF or PCX formats). It provides standard shapes, including boxes, lines, circles, and text characters, and allows freehand sketching as well.

The messages and drawings you create can be sent to individuals, private or public mailing lists, local network bulletin boards, or any combination of these. Creating a message is straightforward. The menu prompts you to select addressees from an on-screen display. After supplying the message subject, you are automatically moved into the word processor. The F10 key returns you from the word processor to the next set of menus, which allow you to add attached files (text and graphics), redisplay the message, change the subject or addressees, or send the message. A receipt option is also available.

If you're in the habit of attaching text files to your messages, you'll love the program's directory feature. Simply point to files from a wide-screen display of filenames and quickly designate them for insertion or attachment.

Reading your messages is just as simple. Both MESSENGR and MAIL display the total number of messages in your mailbox, as well as the number of new ones.

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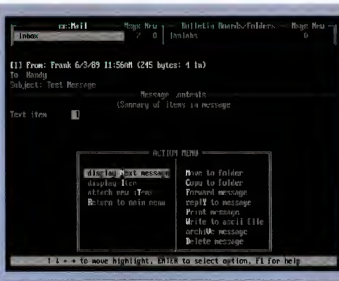
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The cc:Mail menu screen uses a status box on the top and point-and-shoot options on the bottom. The "attach new items" command leads to a list of files that you can select to attach to messages.

The message select option lists the sender, subject, and date for all messages. You select the appropriate message with the cursor keys, and you can read, delete, file, archive, copy, forward, or reply to your message—all through a simple menu-driven sequence.

## MANAGING YOUR MESSAGES

cc:Mail's file-management features are a hit in any league. You can store messages in your own private folders, archive them in DOS files, or post them on LAN bulletin boards. The program handles private as well as public mailing lists; each user can create private lists or access public mailing lists managed by the administrator.

cc:Mail offers password security for each user and stores the message files in an encoded binary format. It includes several utilities for the system administrator such as an activity log, file organizer, and a housekeeper for the hard disk(s).

Available options include expansion to an unlimited number of users, and gateways that let you share messages with other cc:Mail post offices on the same and bridged LANs. A \$295 cc:Remote package services people calling in over telephone lines using remote PCs running cc:Mail. The \$1,295 cc:Mail Gateway package includes add-on modules for IBM's PROFS, Western Union's Easylink services, and Telenet's Telemail services. The cc:Mail Gateway also provides a link to the Action Technologies/Novell MHS protocol.

I did notice a few quirks while testing cc:Mail. The memory-resident MESSENGER doesn't offer all the flexibility of MAIL. For example, it lacks the snapshot and graphics file addition feature. But the most irritating feature of cc:Mail is the requirement that you tell it where to find its data files each time you run the program. The simple solution is to set up a batch file for each user—not a huge task, but nonetheless another maintenance item a system administrator has to cope with.

Nevertheless, cc:Mail is a worthy e-mail system. Besides being quick and easy to install, learn, and operate, it offers you a full range of features: precise file management, password protection, and useful text and graphics editors. The recent addition of RAM-resident modules serves to strengthen a solid package further.

**FACT FILE**

REFERENCE

cc:Mail, Version 3.0  
cc:Mail Inc., 385  
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448-2500, (415) 321-  
0430.  
List Price: 25-user  
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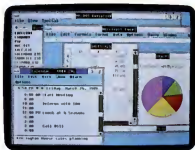
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## The Coordinator II

by M. Keith Thompson

*The Coordinator II*, from Action Technologies, is primarily an electronic-mail package, although integrated into the system are a personal (but not group) calendar, a to-do list maker, and even a "conscience." Known for its highly structured design and slightly tyrannical manner, *The Coordinator* has been received with mixed reactions in the past, but the new release bears the same relationship to its predecessor as Gorbachev does to Stalin. They share common roots, but the new face is much friendlier.

*The Coordinator* now follows IBM's SAA and Common User Access (CUA) guidelines. The intent is clearly to make the program's environment a kinder and gentler place to work. Pull-down menus and sliding bars with functional categories brighten up the screen. The package even includes a new set of canned responses to user questions and requests that are more polite, flexible, and gentler than the previous terse replies. *The Coordinator* includes MHS (only fitting as it comes from the company that developed the protocol), so at \$995 the ten-user version is reasonably priced. However, it's hard to understand the \$495 price tag on the single-user version.

The program has many customization features. You can choose to work with Novice or Expert menus, display function-key settings, and carry forward uncompleted tasks to your next day's calendar. Also, you can choose the first operation—calendar or e-mail, for exam-

ple—that the program will perform after sign-on.

*The Coordinator* displays many different windows of information on the screen: a note from the boss, the agenda for today's meeting, a reminder to pick up some milk, and the specifications for the new rocket can all be visible at once.

The calendar portion of *The Coordinator* allows you to keep track of your own appointments and commitments. Confirmed appointments and obligations noted within e-mail messages automatically appear in the calendar. You can select date ranges to look at appointments, things to do, and things other people want you to do within that time period. At the time of our review, *The Coordinator* did not include workgroup scheduling, but now it is being shipped with an integrated version of Powercore's *Network Scheduler* (reviewed in the section "Imposing Efficiency: Workgroup Productivity Software").


### FOCUS ON E-MAIL

Of course, electronic mail is the heart of this package. *The Coordinator* has all of the standard e-mail features plus a few special ones, such as the ability to send a blind copy of a message. *The Coordinator* handles all e-mail though MHS, so it can exchange mail with a wide variety of dissimilar systems, such as MCI Mail, IBM PROFS, and DEC All-in-1 on mini and mainframe computers.

A small TSR module (which takes up about 8K RAM) is available to alert you to incoming messages, but you have to quit whatever else you are doing and run the package to handle mail or use the calendar.

Squeezing more of the package's functionality into the TSR would be a welcome improvement.


*The Coordinator* adds structure and complexity to the mail process by categorizing mail according to a set of seven types of conversations. Sending messages is easy, but it takes some time to figure out the best way to use the conversation categories. You use Notes for sending messages that do not require a response. Sending an Inform is like sending a letter by certified mail: you get a receipt confirming delivery. Use the Question option to make a simple request that can be answered di-



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**FACT FILE**

**The Coordinator II**  
Action Technologies Inc., 2200 Powell St., Emeryville, CA 94608; (800) 624-2162, (415) 654-4444.  
List Price: Single-user system, \$495; 10-user system, \$995; 30-user system, \$1,995; 50-user system, \$2,995; 100-user system, \$3,995.  
**Requires:** 640K RAM, DOS 3.1 or later.  
**In Short:** A program from the developers of the MHS protocol, designed to make your communications more efficient by categorizing your messages and scheduling calendar appointments. Not for the free-wheeling crowd, but very useful for people who like organization.



**The Coordinator Version II**

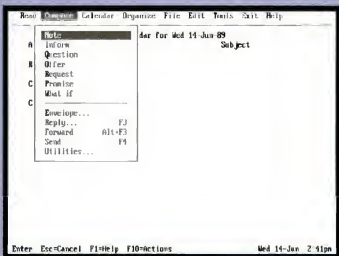
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rectly. Make the question a What If for open-ended and speculative questions. Offers are useful for offering to do something for someone, and Requests are just the opposite. A Promise is just what its name implies.

The user starts a communication by choosing one of the conversation types, then creating the message and addressing the envelope. The text-editing options are comprehensive: word wrapping, copy, cut-and-paste, and block functions are all represented. The envelope has a "reply by" field allowing the sender to request a get-back-to-me date and a field for attaching files, including binary ones.

As for installation, it's a simple matter of inserting eight disks as requested. However, when I accidentally removed disk number 8 before INSTALL was finished, the system crashed. I then had to do a cold boot and reinstall the software from scratch—obviously, an easier form of error recovery in this part of the program would be most welcome.

The most unusual feature of *The Coordinator II* is its ability to categorize and even automate conversations. This Compose menu lets you stipulate what types of message you are creating. Certain types of replies are canned in advance for quick response.





## E-MAIL SYSTEMS: SUMMARY OF FEATURES

(Products listed in alphabetical order)

	cc-Mail	The Coordinator II	Cross-Point	De Vinci eMail	Gallery	The Network Courier	Pere-Mail	PC COMPLETE
<b>OPERATING SYSTEMS AND PROTOCOLS SUPPORTED</b>								
OS/2	●	○	○	○	○	●	●	●
Microsoft Windows	●	○	○	●	○	●	●	●
Unix	●	○	○	○	○	○	○	○
NetBIOS	○	●	●	○	●	●	○	●
IPX	○	●	●	○	●	●	●	○
<b>TSR MODULES</b>								
Message-waiting module (RAM required)	● (10K)	● (8K)	● (5K)	● (2K)	○	● (11K)	● (15K)	○
Message-creation module (RAM required)	● (70K)	○	○	● (100K)	○	● (78K)	● (15K)	● (176K)
<b>MESSAGE PREPARATION AND TRANSMISSION</b>								
Text editor	●	●	●	●	●	●	●	●
Automatic line wrap	●	●	●	●	●	●	●	●
Block moves	●	●	○	●	○	○	●	●
Imports ASCII files	●	●	●	●	●	●	●	●
Allows non-ASCII message attachments	●	●	●	●	●	●	●	●
Gives "return receipt" messages	●	○	●	●	●	●	●	●
Has multiserver (multi-post-office) capability	●	●	Optional (\$395)	●	○	●	●	○
<b>SECURITY</b>								
Password-protected mailbox	●	●	●	●	●	●	●	●
Encrypts message files before transmission	●	○	●	●	○	●	●	●
Encrypts messages during transmission	●	○	●	●	○	●	●	○
<b>GATEWAYS</b>								
To MHS	●	●	○	●	○	○	●	○*
To MCI Mail	● (via MHS)	● (via MHS)	○	Optional (\$795)	○	Optional (\$695)	● (via MHS)	○*
To IBM's PROFS	Optional (\$2,200)	● (via MHS)	○	● (via MHS)	○	Optional (\$5,000)	● (via MHS)	○*
To X.400	○	○	○	○	○	Optional (\$2,500)	○	○*
To DEC Mail	● (via MHS)	● (via MHS)	○	● (via MHS)	○	○	● (via MHS)	○*
To a fax system	Optional (\$995)	●	Optional (\$195)	Optional (\$995)	○	○	●	●

PC — Editor's Choice ● — Yes ○ — No

\* PC COMPLETE uses script files, not gateways, for access to MCI Mail and other services via a local modem.

*The Coordinator* is very effective if you let it be. Its rather unbendable structure might scare off some potential users, but other users will be able to look at it as a super-efficient secretary rather than an intimidating drill sergeant. If your organization is one that is accustomed to having a strictly formulated system of communication or if it might benefit from the implementation of one, *The Coordinator* may be the right choice.

## Cross+Point LAN Communication Software

by Mike Byrd

*Cross+Point LAN Communication Software*, from Cross Information Co. (CIC), is a modestly priced LAN-e-mail package that offers an inventory of information-exchange and information-management features. For \$395, you get e-mail, an internal bulletin board, a document filing system, a personal scheduler, and both free-form and preformatted notepads.

Written in C for DOS 3.2 or later, *Cross+Point* is compatible with most LAN systems; its main prerequisite is access to a shared hard disk directory for all users. One major drawback, though, is that *Cross+Point* is not memory resident. You'll have to load the program each time you want to check your in-box or send mail.

The program offers a sequentially windowed menu e-mail system with in- and out-boxes, message-arrival notification

(both aural and visual), and distribution-list features. Received message titles, file lists, and user lists are also available in a single large window on the right-hand side of the screen. The windowing also allows users to read incoming mail while preparing new mail, a handy feature.

### FURTHERING COMMUNICATIONS

*Cross+Point* has a functional text editor to create new messages and modify existing ones. You can import ASCII and binary files from anywhere in the system, as well as export *Cross+Point*-generated text files to DOS or a printer. An encryption toggle allows encryption of files, mail messages, or fax messages.

The program boasts excellent information-interchange potential. The Bulletin Board feature posts notes to all system users; although users are not alerted to new notes when they log on, a chronologically descending list of received notes is displayed upon request.

Conferencing is one of three additional extra-cost options available for *Cross+Point*. (The company also offers an internetworking option to connect this mail service with another LAN, and a PC-to-fax interfacing component.) Conferencing is a security-controlled system that allows an interactive exchange of comments among a specified group of users. It's a valuable module that lets multiple users brainstorm over the network.

### MAINTENANCE DUTIES

*Cross+Point*'s personal-management features make it easy for each user to maintain an orderly desk. Each user has a personal

filing area; notes, messages, mail, and conference text can be stored in any of three separate folders. Retrieval is easily accomplished through a menu-driven scan-and-read window.

The program, taking its cue from desktop-management packages like *SideKick* and *Tornado*, also helps you organize your business (and personal) life. *Cross+Point*'s Phone+Pad feature is a handy pop-up notepad; Time+Tools is a person-



### FACT FILE

**Cross+Point LAN Communication Software, Version 5.2**

Cross Information Co.,  
1881 Ninth St., Canyon  
Center, #311 Boulder,  
CO 80302; (303) 444-  
7799.

List Price: \$395 per  
server (unlimited users).

**Requires:** 120K RAM, DOS 3.0 or later.  
**In Short:** Its modest price tag and variety of personal information management features make this an appealing system. However, a major drawback is the fact that it cannot be run in RAM-resident mode. Extra-cost options like conferencing are valuable, allowing multiple users to brainstorm over a network.

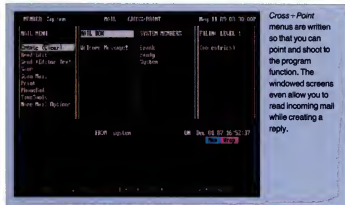
CIRCLE 306 ON READER SERVICE CARD



al scheduling feature and calendar (to 1999) in which you can record meetings, appointments, and to-do lists. Neither, of course, is as powerful as some of the dedicated desktop-management tools, and Time+Tools is somewhat less than user-friendly—especially when it comes to correcting mistakes you make in your schedule. Since *Cross+Point* is not memory resident, the alarm in this module will alert you to impending appointments only if you are currently working within the main application.

### MENU CONFUSION

One of the problems with the program is that its menus are not nearly as logically arranged as those of *cc-Mail*. You may find, initially, that you'll have to reread the documentation and then experiment to figure out how to perform certain operations. For example, after creating a message, I had to search the screen for the clue telling me to hit F4 to get back to the menu so I could choose the Send option. Accessing other functions requires using similar combinations of function keys and menu selections. Once you finally get used to this format, however, subsequent similar tasks



*Cross+Point* menus are written so that you can point and shoot to the program function. The windowed screens even allow you to read incoming mail while creating a reply.

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become easier for you to figure out.

*Cross+Point* is a basic, quietly priced e-mail package that offers several good tools for exchanging information within a single workgroup. And Cross Information offers additional enticement for ordering the package: a 30-day money-back guarantee for *Cross+Point* and unlimited technical support to registered users. But the program's not for everyone. Heavy mail users who need RAM-resident operation, particularly, will have to look elsewhere.

## Da Vinci eMail

by Paul Ferrill

*Da Vinci eMail* from Da Vinci Systems is an easy-to-use full-featured package that has rapidly become a leader in the electronic-mail market. It's no wonder, as this product manages to strike that delicate balance between power and ease-of-use.

You can purchase *Da Vinci eMail* to run under DOS or *Microsoft Windows*. A five-user package for DOS is \$295, while the same package for *Microsoft Windows* is \$445. (A text-based version of the software for OS/2 was not available in time for our review, and a Presentation Manager version of the product is slated for early 1990.)

The *Da Vinci* package uses shared files on the server, so it is totally independent of the networking software or the underlying NetBIOS, IPX, TCP/IP, or other transport layer software. In other words, it runs with any networking software, on any server, and over any LAN cabling scheme.

The DOS version of *Da Vinci* shows its *Windows* heritage, particularly in its mouse support. Any function can be accomplished without touching the keyboard. The designers of *Da Vinci* followed IBM's SAA specifications—for example, the F1 key brings up context-sensitive help. The keystrokes are also consistent from one function to another. If you're not using a mouse, you can move to an option by cursoring to it and pressing Return, by pressing the letter designated to access it, or by using a shortcut key combination.

*Da Vinci* Systems offers a separate package that has a full interface to the MHS mail-routing system for anyone who doesn't use Novell's *NetWare*. The MHS dispatcher option costs \$99 per server. Novell supplies MHS free to *Netware* users upon request. Combining *Da Vinci* and

MHS gives you the ability to send and receive mail to remote networks such as MCI Mail, PROFS, fax systems, and many others.

### RUNNING IN RAM

*Da Vinci* can run as a standalone application, or you can choose to load it as a TSR. The TSR mode gives you all of the functionality of the standard mode plus pop-up convenience—at the expense of 100K of memory. If you spend a lot of time on an e-mail system and can afford to give up that much RAM, the TSR mode is the best to use. Besides, with *Da Vinci* running in background mode, you can select one of several different tunes for your PC to play when new mail arrives.

If you can't afford to part with that much RAM, you can probably spare 2K to load the program's DSALARM TSR. When new mail arrives, you get both a visual message and a beep, alerting you to exit your current application and call up

status field. This makes picking them out of the list a breeze. Unlike *The Network Courier*, *Gallery*, and other packages, *Da Vinci* does not have a way to file your messages in folders. But it is easy to save messages to separate DOS subdirectories.

*Da Vinci*'s features include all of the standard e-mail-handling functions. You can enter names, choose them from lists of all possible users, or select a mailing list. And you can send, forward, or route them as you like.

The mailbox option gives you a way to manipulate messages. Selecting this function pops up a menu allowing you to view, forward, or reply to a message, save it to a file, print it or a list of messages, extract attachments, search your mail, or delete an item. Any of the message-related functions can be performed on multiple messages simultaneously.

Several useful features are available to the user in the Create function. One is the ability to cut and paste parts of other messages or the whole message into the current one. You can also insert an ASCII text file



*Da Vinci*. A nice feature about *Da Vinci* is that you can configure its operations to meet your needs. For example, the choice of a hotkey to access the TSRs, the amount of time the DSALARM messages stay on-screen, and the search path to find the *Da Vinci* files can all be altered to suit you.

### MESSAGING METHODS

The opening screen of *Da Vinci* shows you a list of all messages in the current mailbox. The *Da Vinci* window displays the status, sender, subject, date, and time for each message. All new messages (ones that have not been read) have an N in the

in the message or attach as many files of any type as you like. Files can be typed in or more easily selected from a list using the Lists! function.

For security-conscious users, *Da Vinci* has an encryption option that allows messages to be password protected so that only the intended recipients can read it. The "remember your password" caveat is important in this feature: there's no way to recover it if you forget.

### INSTALLATION AND SUPPORT

Installing *Da Vinci* is easy. The procedure surpassed those found in the other e-mail



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packages—the install program is included on the administrator's disk and takes care of everything except adding users. And *Da Vinci's* documentation for the system administrator has complete instructions for accomplishing that function. The manual,

## PC FACT FILE EDITOR'S CHOICE

### Da Vinci eMail, Version 1.1

Da Vinci Systems, P. O. Box 5427, Raleigh, NC 27650; (919) 839-2000. List Price: Single-user system, \$150; 5-user system, \$295; 5-user Windows version, \$445; DOS server package, \$995; Windows server package, \$1,145; MHS version at no extra charge.

Requires: 384K RAM, DOS 3.0 or later. In Short: An easy-to-install and -use e-mail package with a full set of features, including mouse support, RAM-resident operation, hassle-free installation, and connections to most major e-mail systems. Versions available for small and large networks running under MS-DOS or Windows.

CIRCLE 388 ON READER SERVICE CARD



foreseeing human foibles, also includes sections on topics like "Forgetting the Administrator's Password."

*Da Vinci* doesn't list a toll-free phone number for support, but a technical support staff is available during business hours, eastern standard time. More important, the staff is knowledgeable and responsive.

*Da Vinci eMail* is comprehensive, well designed, and a pleasure to use—with the added plus of hassle-free installation. That, and the fact that the program can be interfaced to just about any e-mail package on the market—including those of main-frame systems—makes this full-featured package a winner.

## Gallery

by Pamela Watson

If you like icons, you'll love *Gallery* from Daystamp Data Products. This \$495 (100-user version) e-mail and file-management product lets you access its mail and file functions via icons that simulate an office environment, such as in- and out-boxes for received and sent mail, and a wastebasket for unwanted messages.

The graphically based icons do away with the need to memorize things like prompt-line or function-key commands. In addition, easy-to-follow on-screen instructions accompany each step of every process. The program is so easy to operate that most users will be sending and receiving mail and performing multiple-filing activities within minutes after they first log on.

### INTELLIGENCE AND FLEXIBILITY

*Gallery* runs under DOS on both Novell and non-Novell networks. The installation program is intelligent enough to sense the kind of network it is on and accordingly to use NetBIOS, IPX, or SPX to send messages across the LAN. Despite the use of graphical icons, the program doesn't require such amenities as a color monitor, graphics card, or mouse.

You can't run the full *Gallery* package in RAM-resident mode, but it will make use of the native message communications of the network (be it NetBIOS, IPX, or SPX) to alert you to incoming mail.

The flexibility of this system is one of its most useful features. *Gallery* comes with two icons installed on the main-menu screen: one for the *Gallery* File module and one for *Gallery* Mail. The network administrator can configure the program so that other applications may be run directly from it—a selection of over 20 icons is available to add to the main screen. If your system is customized to include a number of applications like schedulers, spreadsheets, word processing, and network tools, you can scroll through the main menu until you find the icon of the program you wish to run. Simply highlight it,

press enter, and you're there.

By creating batch files and assigning icons to take you where you want to go within the system, network supervisors can set up public and private mailing lists, filing systems, and public, personal, network, or local menus and submenus. There is no limit to the menus and submenus you can create—for example, the desktop publishing icon in the main screen may give access to two or more typeface-support programs or additional graphics-support programs, and so on down the line. The system is also flexible enough to allow the administrator to protect some menus and yet allow users to alter others, providing varying levels of security for files and mail.

### MAIL AND MORE

Working in *Gallery* Mail is a simple process: for example, after selecting the out-box icon you have the choice of creating mail, seeing who has opened and read your previously sent mail, or viewing or updating your personal mailing lists. The mail you create can be of unlimited length; the text editor offers such functions as automatic line wrap, block moves, and importing of ASCII files. You can also attach any files or other enclosures taken from any directory.

You select addressees by highlighting the desired names from the program's mailing list. Some function-key commands are available throughout the program—for example, pressing F2 at this point will let you select all the people on the mailing list. Once the mail is addressed, *Gallery* will send and automatically save your correspondence. You even have the options of requesting a return re-



*Gallery* comes with its own e-mail service and serves as a front end for other application programs. It carries the use of icons over to network mail management by displaying in- and out-boxes and other pictures for the selection of functions.

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cept and seeing if someone to whom you have sent mail has yet read the message.

You can forward incoming mail, create a reply, save it to a local disk, print it, or toss it in the trash can.

Equally straightforward is Gallery File. After selecting this icon from the main menu, you have the option of storing message text in files (folders) that are set up by the user. For instance, you can create a file to hold all the correspondence you have maintained with a particular vendor or colleague.

Here you will also find a DOS-shell-like utility that gives you the choice of copying files, setting drives, viewing files, changing directories, formatting disks, and printing files.

#### SECURE AND CENSOR

Although text encryption is not available, Gallery has a unique protection feature: security lockout. Security lockout prevents someone from coming to your desk and looking through your e-mail while you're away; pressing Alt-F2 locks the system—your screen will display an icon of a locked door until you return and enter your password. In addition, if you are called away from your desk so abruptly that you do not remember to lock your system, Gallery will automatically do so after 10 minutes of inactivity.

Gallery also takes into account the life of the business traveler. If you're going to be out of the office for a few days, you can set the program to forward your mail to another user automatically rather than have it pile up and go unanswered. It also allows you to censor your own messages that are addressed to someone who has the auto-

forward option turned on—the program alerts you to this fact and tells you who will ultimately receive the mail. You can then choose to send or cancel the message, depending on whether or not you wish this third party to read it.

Gallery's documentation is worth noting: everything is clearly defined, cross-referenced, and carefully indexed. You simply can't get lost in the book. If you do have a problem, Daystrom Data Products not only offers technical support by phone (Monday through Friday during business hours, eastern standard time), but can also be reached via CompuServe. This program rates as a fine choice for any network administrator who wants to make sending mail over a LAN a simple proposition for users. The fact that Gallery offers intelligent installation and flexibility go a long way toward making the system administrator's job easier, too.

## The Network Courier

by Paul Ferrill

The Network Courier stacks up as an easy-to-use e-mail package that has all the basic features and some nifty extras at a reasonable price. For a small network of up to six users, Consumers Software offers a \$295 starter kit that includes all the features of its \$2,495, 500-user package.

The Network Courier allows any user on the network to create and send messages to any other users on the LAN. As of this writing, Consumers Software has announced add-in gateway products allowing connection to external mail systems including MCI Mail, IBM's PROFS, and SNADS.

Consumers Software has also co-developed a highly customized version of The Network Courier with IBM to serve as a DOS-based platform for its OfficeVision products.

#### UP AND RUNNING

Installation of The Network Courier requires the system administrator to create two subdirectories on a single hard disk in the file server. The Install program asks the system administrator for information regarding the type of network (IBM or Novell), the name of the post office and network, and paths to the executable files.

One minor irritation about the administrator's user guide is that it has no table of contents or index, which makes finding a specific topic a chore.

For some reason, the MAIL program expects data to be on the server's M: drive, so you either have to devise a new path or use the networking software to create an

**The Network Courier's  
simple pull-down  
menus allow any user  
to create messages.**

M: drive mapped to the correct subdirectory. After the software is in place, the network administrator creates users for the mail system. As is often the case with LAN e-mail software, this is no great problem for a small network but could be quite tedious for 500 users. Each user gets a set of privileges that includes permission to delete, retrieve, and send messages, or mark them as urgent. The external privilege allows a user to send mail to other post offices on the same network or external networks.

#### MAILING YOUR MESSAGES

Any user on the network can create and send messages using simple pull-down menus. You access the mail system by typing your user name and password, and a screen appears with highlighted options across the top. This screen allows you to generate an address list, read, compose, delete, manage, or print messages, configure your user options, or update your current mail list.

The MAIL program allows each user to maintain a set of folders for filing old messages. The folder files can be on either a local or networked disk. A shared folder on a network disk becomes sort of a special subject matter bulletin board; anyone on the network can write messages to this folder or read the ones that are stored there.

When you select the Compose option to create mail and press the Enter key, the program displays a list of possible addressees for your message from the post office address list. Using the cursor keys to highlight the desired recipient selects that person to receive the mail. You can send mail



#### FACT FILE

##### Gallery, Version 4.5

Daystrom Data Products, 15 Sunrise Hill Rd., Fiskill, NY 12524; (914) 896-7378.

List Price: 100-user system (single server), \$495; additional 8-user system (Novell 3.12 version), \$195.

Requires: 256K RAM, DOS 3.1 or later  
In Short: A flexible e-mail and file-management icon-based package that's simple to install and use; no graphics card or mouse required. Special features include password mail lock and automatic mail forwarding, as well as message arrival notification via the native message communications of the network.

CIRCLE 400 ON READER SERVICE CARD





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### TOPS Tech Specs

- TOPS supports AppleTalk and FlashTalk running on twisted-pair cabling (telephone wire), and EtherTalk on thick or thin Ethernet cabling.
- All IBM PCs, PS/2 Models 25 or 30, or compatibles require TOPS FlashCard, 3Com EtherLink II or Western Digital EtherCard Plus. PS/2 Models 50 through 80, or compatibles require 3Com EtherLink/MC card.
- TOPS can be configured as a distributed, dedicated, or combination server network.

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No wonder, when it comes to making connections, TOPS is the people's choice. Call the TOPS Division of Sun Microsystems at 1-800-445-TOPS, ext. 304.

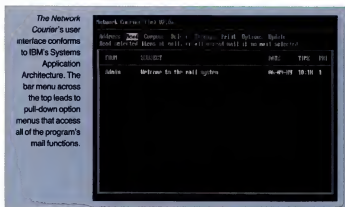


# TOPS®

When you need connections.



From outside the U.S. and Canada, call TOPS at 1-415-769-8700, ext. 304. Or write to TOPS, 950 Marina Village Parkway, Alameda, CA 94501. For information on European distribution, call 44 276 51440.



The Network Courier's user interface conforms to IBM's Systems Application Architecture. The bar menu across the top leads to pull-down option menus that access all of the program's mail functions.

to groups of people by selecting the appropriate mailing list. While completing the TO: and CC: addressee fields, you also have the added ability to search for other names. Once you've selected the person(s) to receive mail, you can display a page of information listing the addressee's full name, address type, mailbox, post office, and network name.

Once the header information is complete, a text editor mode can be used to compose the message. The simple set of commands includes cut-and-paste and the ability to read in any standard ASCII file.

The attachments field lets you attach any DOS file to the mail message—easy to do using the amusingly named Tree Walker function. When you press Enter while the attachments field is highlighted, the program displays a window listing the contents of your current directory. The arrow keys let you move around on the display to select the file to be attached, as well as to move to other directories.

The Network Courier supports the attachment of any kind and any number of files to a message. When you receive a message, it's easy to view and save the attachments; no need to worry about typing in the filenames since the program will save it under its given name in the default subdirectory. Just in case you might have included unflattering opinions about your boss or coworkers in your message, the program asks if it's okay to transmit, offering you a last chance to change your mind.

#### HANDY BACKGROUND PROGRAMS

To complement the mail program, Consumers Software includes several back-

ground utilities for mail management. The Monitor TSR program notifies the user if there is mail waiting. It also contains a subset of the MAIL program's reply, forward, and print functions. The Monitor program takes up around 78K of memory and is accessed by pressing Alt-F1. There are several ways to configure the program to notify you when you have mail: you can select a single beep, a beep and a MAIL flag, or a beep and a visual notice that will identify the sender, the subject, and the priority of the message.

The Micro-Monitor TSR takes up only 11K of memory. It notifies you when an incoming mail message is present but doesn't have facilities for answering or reading the mail.

**FACT FILE**

**PC MAGAZINE**

**The Network Courier, Version 2.0**  
 Consumers Software Inc., 73 Water St., Vancouver, British Columbia, V6B 1A1  
 Canada; (800) 663-8905, (604) 686-4548  
 List Price: 6-user system, \$295; 100-user system, \$695; 500-user system, \$2,495; internetwork version (150 users), \$995; OS/2 version, \$1,495; PROFS gateway version, \$5,000.  
**Requires:** 256K RAM, DOS 3.1 or later.  
**In Short:** A menu-driven, complete e-mail package with a wide range of options and interconnections for electronic mail. Included with its useful message notification background programs is a handy module that makes it easy for your company's telephone operator to post phone messages to the mail system.

CIRCLE 401 ON READER SERVICE CARD

The Operator program is a special version of the Monitor program specifically designed to make it easy for someone who takes telephone messages to post them to the mail system. This little pop-up can truly be the heart of a large organization's message center, as well as a handy utility for a small office.

Other niceties include Consumers Software's free technical support for voice and data callers, and the product's 30-day money-back guarantee.

The Network Courier supplies all the e-mail functions needed by most network users, as well as some handy extras like the Operator function, which can be a real boost to secretaries swamped with phone messages, as well as conformance to a user interface standard. While you don't get some of the advanced capabilities that mark some other products, like direct screen capture and graphics editing, The Network Courier shapes up as a quality product at a competitive price.

## Para-Mail

by Patricia A. McGovern

If your office needs a functional but not feature-laden mail package, consider *Para-Mail* by Paradox Development Corp. This \$689 package gives up to 100 users on a network the ability to send files, graphics, and even programs across the hall or across the country. *Para-Mail* is designed to work with the MHS protocol.

You have the option of using *Para-Mail* as either a foreground program or RAM-resident application. This flexibility to fit individual configurations is one of *Para-Mail*'s most attractive features. As a TSR, *Para-Mail* occupies 75K of RAM and allows you to hotkey in and out to other programs.

*Para-Mail* organizes itself by using folders, categorized at your discretion. Folders can contain messages or notes that are labeled *saved*, *unread*, or *express* (*Para-Mail*'s term for urgent mail). To get into any of the folders, you simply highlight your selection and press Enter. The main menu shows organizational status, the folders that have contents, the date and time, and the status of the folders. The condensed help line at the bottom of the screen appears when you hold down the Alt key; you can access the same type of help menu by hitting F10. When you enter

## PC COMPLETE

by Mike Byrd

Transend's *PC Complete* transcends the drudgery of PC telecommunications by joining a full-featured e-mail package with a telecommunications program and supplying welcome organizational functions in the form of electronic "desktop accessories." The \$229 cost per station seems high compared with that of some of the

*PC COMplete* can be run standalone but also offers memory-resident pop-up capabilities. The memory-resident version, however, gobbles up 176K of your available RAM.

other packages we reviewed, but the program performs its many functions quite well.

*PC Complete* can be run as a standalone application but also offers memory-resident pop-up capabilities. The memory-resident version permits exchange of e-mail and a variety of other mail functions within a current application; a screen prompt and an audible signal alert the user to new mail. However, the memory-resident version gobbles up 176K of your available RAM.

With *PC Complete*, you have access to other *PC Complete* users, including those on other LANs, and commercial electronic-mail services like SourceMail, MCI Mail, GTE Telemail, Dialcom, OnTyme, and HPDesk. What's more, it's so simple to operate that even an e-mail novice can start using it immediately.

## TWO-SIDED SOFTWARE

*PC Complete* is a two-sided package. On a standalone PC, it acts as a modem com-

The program includes most of the standard e-mail functions, including an Attachment feature that lets you secure a file to a message. You can also optionally encrypt a message file and/or ask for a receipt.

The *Para-Mail* package includes a helpful Notepad. Its text-editing options are somewhat sparse: it has functions like word wrapping but neglects to offer helpful features like block moves and deletes. *Para-Mail* does, however, include a handy Quick Search feature. It allows a user to search for words or phrases from the To/From headers, the subject lines, the bodies of text, or a combination thereof. I wish other mail packages made it this easy to find and file messages.

Version 2.1 of *Para-Mail* was scheduled to be released too late for us to include in our evaluation, but Paradox Development says it will offer improvements in features and ease-of-use. One thing the company plans is a RAM-resident version of the program that will occupy only 15K of RAM. We would also welcome more expanded help menus throughout the program, as well as more complete documentation since the current information is rather skimpy. Many users would also probably prefer pull-down menus in place of function-key and Alt-key combination commands.

If you're looking for an e-mail program that supplies the necessary basic requirements, as well as the pleasant seasoning of MHS support, the current version of *Para-Mail* provides sustenance enough. Though not a gourmet package, it won't leave you hungry.

## FACT FILE

**Para-Mail, Version 2.0**

Paradox Development Corp., 7544 Trade St., San Diego, CA 92121; (619) 586-0878.

List Price: 100-user system, \$689; 10-user system, \$389.

Requires: 70K RAM, DOS 2.0 or later.

In Short: While not a feature-crowded product, *Para-Mail* offers ease of use and a new message-notification TSR program that makes it a viable product for customers concentrating mainly on mail. In addition, it offers a handy Quick Search feature to aid in finding files and supports the MHS protocol for connection with dissimilar systems.

CIRCLE 402 ON READER SERVICE CARD

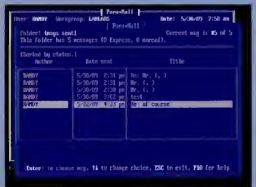
*Para-Mail*, a message line lists the number of messages in the highlighted folder and tells you if they have been read.

## MANEUVERING THROUGH MESSAGES

*Para-Mail* lets you choose either Alt-key-stroke combinations or function keys to perform the same actions. For example, to start a mail message to someone, you either hold down Alt-M or hit the appropriate function key. Once in the mail message screen, pressing a letter key will call up a list of everyone whose name begins with that letter. Simply highlight the name of the party you wish to send the message to and press Enter.

The ease with which you can delete or insert message addressees using the keyboard Del and Ins keys deserves praise. *Para-Mail* will notify you if mail is not picked up by an addressee within a specified time period.

*Para-Mail* lets you sort and categorize your electronic mail in folders. You highlight the folder whose contents you want to read.





# THS-2200



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**We can eliminate some steps from your office routine.**



This isn't an ad for new shoes.

It's about how people can get information they need without having to dance around the company to get it.

It's called the IBM Token-Ring Network.

Think of it as a business organizer that connects your workstations, including PCs and PS/2s® midrange computers, mainframes and peripherals.

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**IBM**

munications program that can call out to electronic-mail services or to similarly equipped PCs to send and receive mail. On a computer attached to a network, *PC Complete* retains its ability to use a local modem for long-distance communications while using the LAN to exchange mail between network stations. It can also use the modem and the gateway services of MHS to connect to dissimilar mail systems. You can mix local and remote addressees in the same message, and *PC Complete* will use the network and your modem to deliver the mail.

*PC Complete* also uses MHS to exchange messages within the LAN and between other LANs using *PC Complete*. It includes a personal gateway feature that allows individual users to exchange mail through e-mail services without requiring a gateway on the file server. Each LAN user can make his own decision regarding connectivity to other mail systems based upon individual requirements. Each user must have a separate copy of the *PC Complete* software.

#### TOOLS OF THE TRADE

Off-line, *PC Complete* gives you excellent tools to help you create and manage mail and use DOS utilities. Access is through a windowed user interface. *PC Complete* serves as the electronic equivalent of an organized desk, with an in-basket, out-basket, wastebasket, baskets for filing mail, and an address book. Function keys select all services.

A windowed menu allows simple access to any of the standard mail functions: read, reply, forward, file, retrieve, edit, delete, or print. *PC Complete* also offers a pop-up file directory that enables users to

view, name, delete, print, copy, and edit DOS files, as well as create or rename DOS directories.

*PC Complete* features a strong, easy-to-use text editor for creating mail off-line. You can import ASCII files or create text internally. The editor includes many capabilities of a larger word processor, such as block commands, word wrap, and search-and-replace functions.

Mail message attachments can be other mail files or DOS files (even binary files). The pop-up Address Book allows easy selection of addressees and/or addressee lists. Message encryption is available, and you can also generate user-designed forms containing text and protected fields. Delivery options include priority, receipt verification, and hard copy.

#### AUTOMATIC MAIL MAGIC

*PC Complete*'s strongest feature is its ability to send and receive mail automatically while unattended. After creating and addressing a message, a single keystroke moves the mail out. If there are addressees outside of the local network, the program dials the receiving PC or electronic mail service, then logs on, uploads mail, downloads available mail, and automatically logs off.

The telecommunications process does not happen in the background mode—the computer is totally occupied making the calls—but *PC Complete* is more flexible than *Lotus Express* and other background communications packages. For instance, *PC Complete* can be programmed to log onto MCI Mail at a preset time—say 3 A.M., or whenever the phone rates are



#### EDITOR'S CHOICE

• Da Vinci eMail

The electronic-mail products we evaluated are so closely competitive that you won't make a mistake if you choose *cc:Mail*, *Da Vinci eMail*, *The Network Courier*, or even *Higgins* (reviewed among the workgroup productivity products). Each one has its own expertise: *cc:Mail* offers a graphics editor that can produce a graphics display from scratch or modify imported screen-capture images; *Da Vinci* provides the most hassle-free installation of all the products; and the *Higgins* \$495 e-mail add-on package just plain outdoes its competition in the group productivity software category. Remember, too, that built-in e-mail packages that come with some network operating systems, 3Com's *3+ Mail* for example, may suffice if your needs are simple.

But when it came to installing one package in the LAN Labs for permanent use, *Da Vinci* came up the winner. To heavy e-mail users, *Da Vinci*'s TSR option is a godsend. In addition, the program provides a notably smooth tie to MHS for MCI Mail, and its flexibility made it possible for us to rearrange some of its keystrokes to suit our liking. *Da Vinci* also provides the necessary security to keep our test results confidential no matter how many people are using the LAN at any given moment. Add to that the happy fact that it doesn't run into trouble on our single *Microsoft Windows*-based machine. For us, *Da Vinci* is the clear choice.

cheapest—for uploading and downloading mail. In the long run, this feature can save you a lot of cash.

The automated upload and download to e-mail services is interesting to watch. Without any intervention on my part, *PC Complete* automatically logged into MCI Mail, uploaded messages, downloaded all messages in my in-box, and logged off. I then read and filed all my messages without leaving *PC Complete*.

*PC Complete* also has a strong modem support package that includes a versatile script language, keyboard macros, and

*PC Complete* incorporates a full-featured terminal/communications program that allows the software to send messages while unattended. On-screen, messages are sorted into "baskets."





*"A computer?  
I wouldn't know  
what to do..."*



*"It takes too long  
to learn and  
use a computer."*



*"I learned word processing,  
but new software is  
like starting over."*

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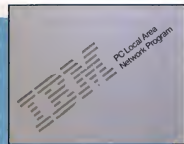
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CIRCLE 313 ON READER SERVICE CARD

## LAN APPLICATION SOFTWARE

### E-MAIL SYSTEMS



#### FACT FILE

**PC COMPLETE, Version 4.10**

Transend Corp., 884 Portola Rd., Portola Valley, CA 94025; (415) 851-3402.

List Price: \$229 per station.

Requires: 320K RAM, DOS 3.1 or later.

**In Short:** A combination e-mail and telecommunications package that uses the LAN or a local modem to deliver messages. The most striking feature is its ability to automatically upload and download messages to and from Dialcom, GTE Telemail, HPDesk, MCI Mail, OnType, SourceMail, other PCs with PC COMPLETE, and LANs.

CIRCLE 403 ON READER SERVICE CARD



Xmodem and Kermit transfer protocols, not to mention ANSI and VT-100 terminal emulation.

Installation of **PC COMPLETE** is simple enough; ours went without a hitch. Seconds after the installation, I was plugging away at the **PC COMPLETE** display, using all of its features. My only complaint is that the program's reliance on function keys means there's a lot of stretching involved for anyone whose keyboard has the F1 through F10 keys along the top.

**PC COMPLETE** has the power and features to satisfy any PC user, novice through expert, including the ability to interface with PC and mainframe computer mail systems. Its ability to send and retrieve mail automatically—and the potential dollar savings this can represent—also helps to make this a product a strong contender.

*Mike Byrd holds master's degrees in engineering and computer science. A fighter pilot for the U.S. Air Force, he is also a division chief in a branch of the federal government that develops sophisticated electronics systems. Paul Ferrill is an electrical engineer with a wide range of experience in both micro- and minicomputer systems. Patricia A. McGovern worked as a systems analyst for Harris-Lanier in Europe. She is currently a partner in a desktop publishing service business. M. Keith Thompson is the inventor of the AT TurboSwitch and the founder of Megahertz Corp. He is a frequent contributor to PC Magazine. Pamela Watson is a free-lance writer whose computer experience dates back to the early days of CP/M.*



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<b>INTO Novell</b>	■	■	■	■	■	■	■	■	■	■	■
<b>INTO Novell Desktop</b>	■	■	■	■	■	■	■	■	■	■	■
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record phone messages  
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tions and reports.

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and link to other spread-  
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"cabinets," "drawers"  
and "folders."

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store and manage  
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perform computations  
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**Appointment Book/To Do's**  
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and list to do's.

**YES,** I want to get  
*into* networking  
the easy way. So  
send me your free  
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**free  
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# If you want better word processing, don't settle for Perfect.

The trouble with WordPerfect® is, sometimes it isn't. Not when you compare it to our new Microsoft® Word version 5.0. Not when you consider that with Word 5.0, you'll pump out your day-to-day jobs quicker, easier, even smarter than you ever thought possible. On your IBM® PC

or 100% compatible. It doesn't get much simpler than this.

Example: With Word 5.0 you can choose commands by either using simple speed keys or just selecting from a menu.

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Your workgroup can even make any

annotations right on a document, then you can merge and collect all the comments. WordPerfect? No comment.

You can also sort, list, search and archive files across multiple directories,

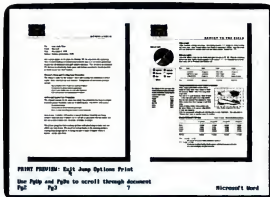
COMMON WORDPROCESSING TASKS		
Which requires fewer keystrokes?	Microsoft Word 5.0	WordPerfect 5.0
Copy Block	4	7
Delete Line	2	4
Italicize Word	2	5
Change Font and Size	6	9
Add Footer	1	7
Box Paragraph	5	12
<b>Total</b>	<b>20</b>	<b>44</b>

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All of which is reason enough to try new Word 5.0. But for those who need a little more



Word 5.0 Print Preview makes sure what you see is what you want. Before you print it.



Introducing new Microsoft Word 5.0. When Perfect just isn't good enough.



## REPORT TO THE FIELD

Sales per region



The following are the most recent sales numbers for the Arbor regional sales offices. All client and distributor inquiries should be directed to these numbers.

Los Angeles	8070
Atlanta	2570
Chicago	6724
New York	5857
Miami	5470
Seattle	8870

### Shoe enough

Arbor Footwear coming and going: Jim Dearing becomes V.P. Design for Arbor Evening and Dress wear. Greg Vincosa moves from Peoria to marketing in Miami. Joan MacArthur and Lisa Dean become account supervisor and media planner, respectively. *Page 2*

### Sales per region

Across the board it looks like the South once again led sales in FY '88. With the continuing pump crane shoe figures should maintain, if not improve. *Page 3* It's important not to let the other areas such as Northeast and Midwest fall.

Style	Dress	Sport	Casual	Special
Evening and	Wholesaler	Teller made	Trainer up	
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Sport	120,000	85,000	75,000	80,000
TOTAL	355,000	355,000	255,000	170,000

Notes: 9/22/88, 4:30 PM

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Notes: 9/22/88, 1:15 PM

Figure for Northwest and Midwest should be calculated separately mid-month let's catch them before they fall into prison.

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CIRCLE 321 ON READER SERVICE CARD

by  
Jeff Proisie

# Lab Notes

Even inexpensive modems run at 2,400 bits per second today, and newer designs push the upper limit to 9,600 bps and beyond. Direct serial links between machines allow even higher transmission rates. 300-bps communications programs went out with the Hula Hoop—about the time the designers of DOS wrote its serial driver.

There's nothing in DOS itself to preclude high-speed serial I/O, of course. It's just that a DOS communications program has to write its way around the operating system and supply its own communications facilities. In this first of a two-part series on serial communications programming, we give an overview of the DOS communications environment, then present and analyze a terminal emulation program with advanced input capabilities. Next time, we'll do the same for the more hospitable OS/2 communications environment. Part 2 will culminate in the code listing for a protected-mode terminal emulator that highlights the differences between the two environments and permits a machine running OS/2 to communicate with another running DOS.

The communications resources that DOS supplies are meager at best. Only one serial port can be accessed at a time, and the DOS AUX serial device driver is slow, rudimentary in design, and adequate only for polled I/O. In a polled I/O system the speed must be slow enough to allow the CPU to spend an appreciable fraction of its clock cycles checking each port in turn ("polling") to see whether a character is waiting to be either transmitted or received. This is impractical for speeds greater than 300 bps.

Handling high-speed data transfers requires more-sophisticated, interrupt-driven I/O techniques. In an interrupt-driven system the CPU doesn't waste clock cycles looking for work. Instead, the UART chip that drives the serial port grabs the attention of the CPU ("interrupts") only when a character actually arrives. If the interrupt handler is written with sufficiently

**HIGH-SPEED COMMUNICATIONS IN DOS AND OS/2: Under DOS you need special programming techniques to implement interrupt-driven operation. We'll take a look at these and, in the next issue, explore OS/2's support for serial communications.**

low overhead, the chance of losing an incoming character because the last character is still being processed is virtually nil. Similarly, in interrupt-driven output, the serial port notifies the CPU when another character can be transmitted, freeing it to keep up with other tasks in the interim.

The DOS services that support serial I/O through the interrupt 0x21 interface are simply inadequate for interrupt-driven applications. (Note: The 0x prefix is the C language method of denoting hexadecimal numbers, a convention we've adopted here.) Indeed, since DOS provides no facilities for programs even to initialize the serial port to given transfer rates and line control settings, programmers must fall back either on using the ROM BIOS or programming the serial port hardware directly. As we'll see, however, the BIOS

offers only slightly better support for serial I/O than does DOS itself. Thus, as a practical fact of life, DOS programmers have long grown accustomed to bypassing the operating system and firmware altogether to transmit and receive serial data.

## DOS COMMUNICATIONS ENVIRONMENT

The heart of a serial port is a chip called the Universal Asynchronous Receiver/Transmitter, or UART. It is the UART that physically transmits and receives characters through the pins of an RS-232 connector. When a character is to be transmitted, the UART frames it with the proper start, stop, and parity bits. The UART then puts this data, one bit at a time, onto the TD (Transmit Data) pin, at predefined intervals. Likewise, when an incoming data packet is received on the RD (Receive Data) pin, the UART disassembles the packet and presents it in the form of an unframed 7- or 8-bit character. The specific UART used in the IBM PC family is a National INS8250 Asynchronous Communications Controller (or a workalike). It's more commonly referred to as "the 8250," or simply "the UART."

The UART also supplies a number of higher-level functions that help put character input and output under program control. If desired, it will compare the parity bit of each character it receives against a parity value it calculates itself and report a *parity error* if the two don't agree. It will also report a *receiver overrun* error if a received character isn't read from the UART's internal buffer before the next one arrives, and a *framing error* if an incorrect stop bit is detected.

Registers inside the UART hard-wired to the RS-232 control pins allow programs to perform hardware *handshaking* with devices connected to the serial port. Thus, for example, a transmitting device may assert the RTS pin, indicating that it is Ready to Send a character. Before actually sending the character, however, the transmitting device may require confirmation that the device on the other end of the line is

## Lab Notes

ready to receive. The UART provides this confirming "handshake" by asserting the CTS (Clear to Send) pin.

The BIOS does provide four interrupt 0x14 functions designed to permit applications to use the serial port without requiring programmers to deal directly with the inner complexities of the UART. These functions are detailed in Figure 1. Function 0 initializes the UART to the data transfer rate (expressed in bits per second) and line control settings specified by the bit pattern in AL. Rates up to 9,600 bps are supported. Function 1 transmits the character in AL to the serial port, while function 2 reads a character from it. Function 3 returns a 16-bit value that represents the status of the serial port in AX. On return, AH reflects the current line status (acquired directly from the UART's Line Status register) and AL holds the modem status bits (obtained from the Modem Status register).

Functions 2 and 3 use simple hardware handshaking schemes to make sure that spurious data is neither transmitted nor received. Function 2 asserts DTR (Data Terminal Ready) and RTS (Ready to Send) before outputting a character. It then waits for DSR (Data Set Ready) and CTS (Clear to Send) to be asserted in response. Function 3 asserts DTR, then waits for DSR to be asserted before attempting to read a character.

The vital shortcoming of these services, however, is that the BIOS has no way to alter the handshaking modes. The BIOS services are thus generally limited to use in two programs designed to talk to each other, or to situations in which the device on the other end of the line is known to employ the same protocol.

Figure 2 shows how several DOS interrupt 0x21 services use the BIOS to provide simple input and output services. Function 3 of interrupt 0x21 waits for a character to appear at the serial port and returns it in AL. Function 4 transmits the character in DL. The primary difference between the DOS and BIOS character transmit and receive services is that the BIOS routines will return to the caller with bit 7 of AH set if a time-out counter expires before a character can be transmitted or read. The DOS functions, by contrast, will hang in an endless loop. You can prevent such hangups by checking the status of the UART before



### BYPASSING THE UART

#### Function 0: Initialize Serial Port

Call with: AH = 0  
AL = Communications parameters (see below)  
DX = Serial port number (0-3)

Returns: AH = Line status (see function 3 below)  
AL = Modem status (see function 3 below)  
Bit 7 is set in AH if function timed-out

Bit settings in the communications parameters byte:

Bits 7, 6, 5	Data rate	Bits 4, 3	Parity setting
000	110 bps	X0	No parity
001	150 bps	01	Odd
010	300 bps	11	Even
011	600 bps	Bit 2	Number of stop bits
100	1,200 bps	0	1 bit
101	2,400 bps	1	2 bits
110	4,800 bps	Bits 1, 0	Number of data bits
111	9,600 bps	10	7 bits
		11	8 bits

#### Function 1: Output Character

Call with: AH = 1  
AL = Character code  
DX = Serial port number (0-3)

Returns: AH = Line status (see function 3 below)  
Bit 7 is set in AH if function timed-out

#### Function 2: Input Character

Call with: AH = 2  
DX = Serial port number (0-3)

Returns: AH = Line status (see function 3 below)  
AL = Character code  
Bit 7 is set in AH if function timed-out

#### Function 3: Get Serial Port Status

Call with: AH = 3  
DX = Serial port number (0-3)

Returns: AH = Line Status  
Bit 7 = Undefined  
Bit 6 = Transmit Holding and Transmit Shift registers empty  
Bit 5 = Transmit Holding register empty  
Bit 4 = BREAK detected  
Bit 3 = Framing error  
Bit 2 = Parity error  
Bit 1 = Overrun error  
Bit 0 = Data ready in Receive Buffer register

AL = Modem Status  
Bit 7 = DCD (Data Carrier Detect) asserted  
Bit 6 = RI (Ring Indicator) asserted  
Bit 5 = DSR (Data Set Ready) asserted  
Bit 4 = CTS (Clear to Send) asserted  
Bit 3 = Delta DCD  
Bit 2 = Delta RI  
Bit 1 = Delta DSR  
Bit 0 = Delta CTS

Figure 1: The BIOS interrupt 0x14 does provide programmers with a set of functions for creating applications that can access the serial port, without requiring them to deal directly with the inner complexities of the UART. However, these services lack the flexibility needed to support a variety of handshaking methods and are, therefore, generally limited.

## Lab Notes

calling function 3 or 4. The only way to do this without bypassing the operating system altogether, however, is by making a separate call to IOCTL, which is a highly inefficient procedure.

There are, as indicated, additional problems about DOS's serial I/O support. For one, the only means DOS provides to initialize a serial port or point the AUX driver to a device other than COM1 is by execution of a MODE command from the command line. Worse, like the BIOS services, the DOS services are inherently suited for polled I/O only; interrupt-driven operation requires special programming.

### FACING THE INEVITABLE

Thus, when running under DOS, neither its services nor the BIOS's are adequate for high-speed serial communications. The functionality needed for interrupt-driven I/O is available only by dispensing with the operating system's aid and working directly at the UART level.

The UART is programmed to generate an interrupt when an I/O-related event occurs, and the 8259 Programmable Interrupt Controller is programmed to pass the interrupt on to the CPU. By setting selected bits in its Interrupt Enable register, the UART can be made to generate an interrupt under a wide variety of conditions: when a byte is received in its Receive Buffer register; when its Transmit Holding register is ready to accept another character; when a parity, overrun, or framing error occurs; when a BREAK is detected; or when the state of an RS-232 input pin

changes. The application program sets up interrupt handlers to service each interrupt it has chosen to recognize. If more than one type of interrupt is enabled, the program can determine which condition triggered the most recent one by reading the UART's Interrupt Identification register.

A layout of the UART registers is shown in Figure 3. Within the PC, a table containing the 16-bit I/O addresses of all UARTs installed in the system is stored at offset 0 in the BIOS data area. Once a UART's base address is obtained, its internal registers are accessed relative to that base. An address of 0 indicates that the corresponding serial port is not installed. Figure 4 shows how the UART generates and identifies interrupts.

In addition to the Interrupt Enable and Interrupt Identification registers, the Receive Buffer/Transmit Holding, Line Control, and Modem Control registers also play an important role in interrupt-driven serial communications. The Receive Buffer/Transmit Holding register performs double-duty: a byte written to it with an OUT instruction is transferred to the UART's Transmit Shift register and output; a byte read from it with an IN is pulled from the UART's Receive Buffer register.

The Line Control register contains data format information, which defines the number of data bits, the number of stop bits, and the parity setting. In addition, bit 7 of this register serves as the Divisor Latch Access Bit, or DLAB. When DLAB is zero, the ports at offsets 0 and 1 from the base address correspond to the UART's Receive Buffer/Transmit Holding and Interrupt Enable registers, respectively; when DLAB is 1, the same I/O addresses are mapped to the Baud Rate Divisor registers. An interrupt service routine that reads the serial port must thus take care to clear DLAB before reading a character with an IN from the address at offset 0. Otherwise, the character returned may actually have come from the LSB (Least-Significant-Bit) Baud Rate Divisor register.

Finally, the Modem Status register contains the DTR (Data Terminal Ready) and RTS (Request to Send) control bits. It also contains the general-purpose GPO2 output bit. In the IBM implementation, this bit must be set before UART interrupts can reach the CPU. Bits that correspond to the RS-232 input pins DSR (Data Set Ready), CTS (Clear to Send), RI (Ring Indicator), and DCD (Data Carrier Detect), when needed, are found in the Modem Status register.

### THE DOS COMMUNICATIONS MODEL

The core of a DOS communications program is the set of interrupt service routines (ISRs) that processes UART interrupts. This module may either be incorporated within the program itself, or it may take the form of an installable device driver that is loaded from the CONFIG.SYS file. Most software writers choose the former alternative, reasoning that an application program should be written so that its operation is independent of external resources. Moreover, an I/O module contained in an .EXE file is erased when the program terminates.

The number and sophistication of interrupt service routines that are written depends upon the nature of the communications services needed.

A device driver, on the other hand, remains in memory until the system is restarted. This wastes RAM that could be used by subsequently loaded application programs.

The number and relative sophistication of interrupt service routines to be written depends upon the nature of the communications services needed. A simple application, such as the terminal emulator presented here, will have at least one ISR to intercept interrupts triggered when a character is received by the UART. The ISR reads incoming characters and buffers them in a circular first-in, first-out (FIFO) queue.

The balance of the program—the portion that processes input—reads from the queue rather than from the UART. The procedure is identical to the way the BIOS buffers keystrokes in the keyboard buffer and makes them available through interrupt 0x16.

As long as the queue isn't filled, the primary program routines are freed from the time constraints that are normally associ-

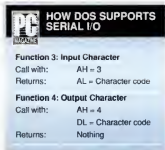


Figure 2: The rudimentary serial I/O services that DOS interrupt 0x21 supplies do not include any way of initializing ports and will hang if a time-out error is encountered.



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ed with high-speed asynchronous I/O processing. And since the ISR is responsible only for reading and buffering incoming data, unless the transfer rate is extremely high the likelihood that it will miss a character is slight.

More sophisticated ISRs shoulder additional burdens. If high-speed data output is required, an application can effect interrupt-driven output by setting up a separate ISR to service the UART interrupts that are generated as the Transmit Holding register is emptied.

Output will be directed to a holding buffer and it will then be spooled to the UART, a character at a time, by the ISR. Additional ISRs can also handle errors reported by the UART, if desired.

A properly written communications program running under DOS can achieve data transfer rates beyond 9,600 bps even on a 4.77-MHz PC, as is proved by some of the commercial utilities that have been designed to transfer data between laptop

PCs and desktop models over specially built cables. Faster machines can handle even higher rates.

Note, however, that at high transfer rates approaching the threshold of a given PC's capabilities, programs must usually be optimized for speed at the expense of handshaking and parity checking. Under these circumstances, file-transfer protocols with fixed packet sizes are used to make sure that transmission errors are detected and corrected.

## IMPLEMENTING THE MODEL

The schematic representation of a communications program that carries its own interrupt-driven serial input logic on-board is shown in Figure 5. Incoming data is received and buffered by an ISR and the program, as described above, reads data from the input queue. In the typical fashion of a terminal emulator, in which the output rate is no greater than the speed of the typist, outgoing data is delivered directly to the UART. Note that the operating system and

PC THE UART REGISTERS	
Base Address	
+0:	Receive Buffer/Transmit Holding
+1:	Interrupt Enable
+2:	Interrupt Identification
+3:	Line Control
+4:	Modem Control
+5:	Line Status
+6:	Modem Status
+0:	LSB Baud Rate Divisor*
+1:	MSB Baud Rate Divisor*

\*Mapped into this address when DLAB = 1. DLAB is the Divisor Latch Access Bit, which is bit 7 of the Line Control register. When DLAB is 0, the Receive Buffer/Transmit Holding register is accessed at offset 0 and Interrupt Enable at offset 1. When DLAB is 1, the same I/O addresses correspond to the Baud Rate Divisor Latch registers.

Figure 3: To access and program an internal register of the UART, you must first obtain the correct base address from the table stored in the BIOS data area. To write to the internal registers listed above, you then add the corresponding offset values to the base address. The range of services that each UART register provides is detailed in Figure 4.

PC HOW THE UART GENERATES AND IDENTIFIES INTERRUPTS	
<b>Interrupt Enable Register:</b>	
Bit 7 = Always 0	Bit 3 = Change in RS-232 input pin
Bit 6 = Always 0	Bit 2 = Error or BREAK detected
Bit 5 = Always 0	Bit 1 = Transmit Holding register empty
Bit 4 = Always 0	Bit 0 = Data ready in Receive Buffer register
<b>Interrupt Identification Register:</b>	
Bits 3, 2, 1 Interrupt source	010 Transmit Holding register empty
001 No interrupt	000 Change in RS-232 input pin
110 Error or BREAK detected	
100 Data ready in Receive Buffer register	
<b>Line Control Register:</b>	
Bit 7 = Divisor Latch Access Bit	Bit 2 Number of stop bits
Bit 6 = BREAK control	0 1 bit
0 Off	1 2 bits
1 On	
Bits 5, 4, 3 Parity setting	Bits 1, 0 Number of data bits
000 No parity	00 5 bits
001 Odd	01 6 bits
011 Even	10 7 bits
101 Mark	11 8 bits
111 Space	
<b>Modem Control Register:</b>	
Bit 7 = Always 0	Bit 3 = GPO2
Bit 6 = Always 0	Bit 2 = GPO3
Bit 5 = Always 0	Bit 1 = RTS
Bit 4 = Loopback test	Bit 0 = DTR
<b>Line Status Register:</b>	
Bit 7 = Always 0	Bit 3 = Framing error
Bit 6 = Transmit Holding and Transmit Shift registers empty	Bit 2 = Parity error
Bit 5 = Transmit Holding register empty	Bit 1 = Overrun error
Bit 4 = BREAK detected	Bit 0 = Data ready in Receive Buffer register
<b>Modem Status Register:</b>	
Bit 7 = DCD asserted	Bit 3 = Delta DCD
Bit 6 = RI asserted	Bit 2 = Delta RI
Bit 5 = DSR asserted	Bit 1 = Delta DSR
Bit 4 = CTS asserted	Bit 0 = Delta CTS

Figure 4: By programming the UART directly, the full range of services needed for interrupt-driven serial communications is made available.

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BIOS are merely spectators; all interaction takes place between the communications program and the serial port hardware.

This schema is implemented in DOSTERM, a simple but fully functional terminal emulation program that permits characters typed at one PC to appear on the screen of another. The COM1 ports of the two PCs should be tied together by a null modem cable—that is, a cable in which the TD and RD lines are cross-wired so that what is transmitted on TD at one end presents itself on RD at the other end.

The assembly language listing for DOSTERM is shown in Figure 6. The program is designed to be assembled and linked into a standalone .EXE file. Following the conceptual model diagrammed in Figure 5, DOSTERM sets aside a 1,024-byte internal buffer for incoming characters and provides an ISR—labeled READ\_COM in the source code—to service them. It displays incoming data on the screen, echoes any characters typed at its own keyboard to the screen before transmitting them out COM1, and terminates when the Esc key is pressed.

In the interest of simplicity, DOSTERM performs no handshaking with the external device to which it is linked. (It does, however, assert DTR and RTS, just in case the device at the other end relies on these pins.) Nor does it offer any means of flow control—a subject that will be treated in more detail in next issue's discussion of OS/2 communications programming.

At startup, DOSTERM initializes the UART and the 8259A for interrupt-driven operation. The appropriate software interrupt—0x0C for COM1 (0x0B would have been used had the program been written for COM2)—is altered to point to an ISR that provides low-level communications services. The ISR is complemented by two routines, READ\_CHAR and SEND\_CHAR, that act as an interface to the rest of the program. It calls these routines as needed to read and write characters to and from the serial port, completely oblivious to the fact that incoming characters are being buffered in the background by another component of the same program. Just before the program terminates, it deprograms the UART and 8259A and restores the interrupt vector that was displaced at runtime. After performing normal housekeeping chores, it ends, leaving

the system in the same state it was in when it started.

Proper execution of the hardware initialization sequence is critically important. To set up its host for interrupt-driven I/O, DOSTERM performs the following steps:

- Obtains the base address of the COM1 UART from the BIOS data area;
- Changes the interrupt 0x0C vector to route UART interrupts to the interrupt service routine READ\_COM;
- Initializes the UART to 9,600 bps, no parity, 8 data bits, and 1 stop bit, using the BIOS interrupt 0x14, function 0 (the serial port setup service);
- Unmasks IRQ4 interrupts (corresponding to COM1) by clearing bit 4 of the 8259A's interrupt mask register at I/O address 0x21;
- Sets bit 0 of the UART's Interrupt Enable register so that an interrupt will be generated whenever a character is received by COM1;
- Asserts bit 3 of the UART's Modem Control register so interrupts can reach the CPU. At the same time, bits 0 and 1 are set, enabling DTR and RTS, which signi-

fies that the UART is ready to receive data.

DOSTERM takes a shortcut by using the BIOS to initialize the UART to the desired data transfer rate and line settings. As an alternative, it could have written the values directly to the Line Control and Divisor Baud Rate registers.

Interrupts generated by COM1 and COM2 are tied to the PC's dedicated IRQ4 and IRQ3 hardware interrupt lines, respectively. These, in turn, are associated with software interrupts 0x0C and 0x0B. The first step in setting up an ISR to service UART interrupts is to point the appropriate interrupt vector to it. In DOSTERM, which uses COM1 exclusively, this interrupt is 0x0C. The original value of the vector is saved before modification so that it can be restored upon termination.

No hardware interrupt can reach the CPU until the corresponding bit in the 8259A's interrupt mask register is set to 0. Bits 3 and 4 are assigned to IRQ3 and IRQ4, respectively, and the default setting of both bits is 1. This disables both the IRQ3 and IRQ4 interrupts unless a program takes explicit action to enable them.

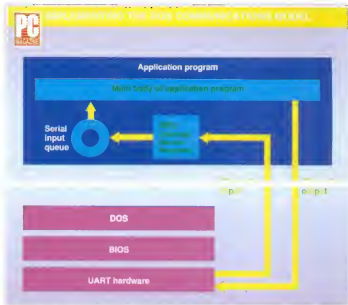


Figure 5: When a DOS communications program requires interrupt-driven input, both the operating system and BIOS must be bypassed and the UART programmed directly. In this model, an ISR handles interrupts triggered by the UART when a character is waiting to be read. The character is buffered in a circular queue from which the program can retrieve it when time permits. Outgoing characters are sent directly to the UART's Transmit Holding register, a technique typical in a terminal emulator whose data transmission rates are low.

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DOSTERM enables COM1 interrupts but leaves COM2 interrupts masked off. It then follows up by asserting GPO2 (bit 3) in the UART's Modem Control register. GPO2 controls a hardware gateway in the PC that, when closed, cuts off UART interrupts before they reach the 8259A.

At this point, the ISR is being properly addressed by an interrupt vector, and the path from the UART hardware to the CPU is clear. It then remains only to activate UART interrupts by setting bit 0 of its Interrupt Enable register. By default, all bits in this register are clear. With bit 0 set, interrupts are triggered when characters are delivered to the Receive Buffer register, a sign that data is waiting to be read. Other bits control other interrupt options. Had DOSTERM been endowed with interrupt-driven output capabilities, it would have also set bit 1 so that it would be notified when the Transmit Holding register could accept another character for output.

Adding interrupt-driven output would have introduced one further complication, however. Since only one interrupt vector is assigned to each serial port, if two ISRs are needed to service it (one for data-ready interrupts, another for Transmit Holding register-ready interrupts), both ISRs

would have to be combined into a single ISR package. A dispatcher at the front end of the package would be required to determine which condition triggered the interrupt and to route execution to the input or the output ISR appropriately.

The key to performing such electronic gymnastics is the UART's Interrupt Identification register. When interrupts are multiplexed, the lower 3 bits of the Interrupt Identification register identify the source of the last interrupt. A Data Ready condition, for example, is characterized by the value 4. A value of 2 identifies a Transmit Holding register-ready interrupt. Other interrupt ID values are shown in the section of Figure 4 that maps the Interrupt Identification register.

READ.COM reads the serial port and puts each successive character into a 1,024-byte FIFO queue named DATA\_BUFFER. Two pointers into the buffer—BUFFER\_HEAD and BUFFER\_TAIL—designate where the next character will be written to and extracted from, respectively.

Incoming characters are copied into the location indexed by BUFFER\_HEAD. After a character is inserted, BUFFER\_HEAD is advanced so that the next character will not overwrite the last. When a character is read from the buffer, it is retrieved from the address held in BUFFER\_TAIL, and BUFFER\_TAIL is in

turn incremented to the next position. Thus, when the head and tail addresses are equal, the buffer is empty, and when the next increment of the head would allow it to overtake the tail, the buffer is full. If a new character is received with the buffer full, it is ignored. The next one will be duly buffered provided that a slot has opened for it in the queue.

To ensure that it gets top priority when an interrupt is received, READ.COM leaves interrupts disabled while it runs. Before it ends, it sends an end-of-interrupt command to the 8259A to signal that processing is completed. Until this occurs, hardware interrupts of equal and lower priority are withheld from the CPU.

READ.COM operates asynchronously from the main body of the program, which is contained in the procedure TERM. TERM executes a simple loop, alternately polling the keyboard and serial input buffers for data. When a keycode appears in the keyboard buffer, it is read, displayed, and transmitted; when a character appears in the serial input queue, it is read and displayed. The queue is checked for new characters simply by comparing the head and tail addresses. If the addresses are the same, no data is waiting to be read.

Characters are read from the queue with the subroutine READ\_CHAR. To ensure that it isn't interrupted by READ.COM while in the midst of extracting a character

DOSTERM.EXE		1 of 2	
<pre> 11 DOSTERM.ASM - A DOS terminal emulation program 12 13 This code illustrates how a program written for the DOS 14 environment can program the UART and interrupt controller 15 for interrupt-driven serial I/O. An ISR is set up to 16 service received data ready interrupts coming from IRQ4 (COM1) 17 and buffer the data in a 1,024-byte circular queue similar to 18 the BIOS keyboard buffer. 19 20 Characters are read from the queue by calling the subroutine 21 READ_CHAR. Characters transmitted are output directly to the 22 UART by SEND_CHAR. Execution ends when the Esc key is pressed. 23 24 Copyright (c) 1989 Riff Communications Company           </pre>			
<pre> INT4M equ 24h ; 8259A IRQ control register INT4M equ 24h ; 8259A IRQ mask register  data segment word public 'DATA' error_msg db "COM1 not installed!\n\n" data_buffer db 1024 dup (?) ; input buffer buffer_start dw offset data_buffer ; starting buffer address buffer_end dw offset buffer_start ; ending buffer address buffer_head dw offset data_buffer ; location for next write buffer_tail dw offset data_buffer ; location for next read uart_addr dw ? ; UART base address int4m dw ? ; old interrupt 8ch vector data ends  stack segment stack dw 256 dup (?) ; stack area stack ends  code segment word public 'CODE' assume cs:code,ds:data,ss:stack  17 MAIN initializes the system for interrupt-driven input and           </pre>	<pre> 11 calls TERM to perform terminal emulation functions. 12 main proc far mov ax,data ; point DS to the data mov dx,ax ; segment  13 Obtain the base address of COM1 from the 8206 data area. 14 mov ax,40h ; point ES to data area mov es,ax mov word ptr es:[8] ; get the word at 0040:0000 mov taddr,ax ; save it  15 mov ax,ax ; ja!nt an error if COM1 jnz error ; is not installed mov ah,9 mov dx,offset error_msg int 21h mov ax,4c01h int 21h  16 Save the old interrupt 8ch vector and point it to READ_COM. 17 vector: mov ax,358Ch ; obtain and save the current int 21h ; value of the int 8ch mov word ptr int8ch,ax ; vector mov word ptr int8ch[2],ax  assume ds:nothing ; save DS push ds mov ax,cs mov ds,ax mov ax,358Ch ; revector to our own mov dx,offset read_com ; interrupt handler int 21h pop ds ; restore DS           </pre>		

Figure 6: The assembly language listing for DOSTERM.EXE, a simple interrupt-driven terminal emulation program that allows characters typed on one PC to be sent, via a null modem cable, to the screen of a second PC. DOSTERM performs no handshaking with the external device to which it is linked.

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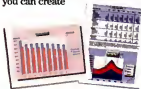


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## DOSTERM.EXE

2 of 2

```

        assume ds=data
; Initialize the UART to 8192 N16.
;
        mov     ax,8000h           ;6000 bps, no parity,
        shr     dx,dx             ; 8 data bits, and 1
        int     14h              ; stop bit
; Unmask IRQ4 interrupts in the 8258's IRQ mask register.
;
        in      al,INTA81         ;clear bit 4 to unmask
        and     al,0FFh          ; IRQ4 (COM1) interrupts
        out     INTA81,al
; Initialize the Interrupt Enable Register and assert GPO2.
;
        mov     dx,uart_addr      ;first clear OEAR
        add     dx,3
        in      al,dx
        and     al,07Fh
        out     dx,al

        shr     dx,2             ;set bit 8 for received data
        mov     al,1
        out     dx,al            ; ready interrupts

        add     dx,3
        mov     al,08h
        out     dx,al            ;assert GPO2, DTR, and RTS
; Send and receive characters until ESC is pressed.
;
        call    term
; Reset the system and exit.
;
        mov     dx,uart_addr      ;clear bits 0, 1, and 3 of
        add     dx,6              ; the Mode Control Register
        in      al,dx
        and     al,0F4h
        out     dx,al
        sub     dx,3             ;disable UART interrupts
        mov     al,al
        out     dx,al

        in      al,INTA81         ;mask off IRQ4 interrupts
        or      al,10h           ; that reach the 8258A
        out     dx,al

        mov     ax,250Ch          ;reset the int 8ch vector
        lda     ds,[int8ch]
        stb     21h

        mov     ax,4C80h          ;terminate
        ldt     21h
        andp

main:
;
; Y8M transmits characters typed at the keyboard and displays those
; received at the serial port.
;
term    proc    near
; Check the keyboard buffer and process any waiting keycodes.
;
term_loop:  mov     ah,1           ;don't read the keyboard if
        int     16h             ; nothing is waiting
        js     keys_clear

        mov     ah,ah           ;read keycode
        int     16h
        or      al,al           ;ignore extended keycodes
        js     keys_clear
        cmp     al,010h         ;exit if ESC was pressed
        jne     output

output:     push     ax           ;display the character
        call    display_char
        pop

        call    send_char       ;output the character

; Check the serial input buffer and read it if a character is waiting.
;
keys_clear: mov     ax,buffer_tail ;loop back if the buffer is
        cmp     ax,buffer_head   ; empty
        je     term_loop

        call    read_char       ;extract character from buffer

        call    display_char     ;display it
        jmp     term_loop        ;return to loop

term      endp

;
; READ_CHAR waits for a character to appear in the serial input
; queue, then reads it and returns it in AL.
;
read_char proc    near
        mov     bx,buffer_tail   ;loop until a character
        cmp     bx,buffer_head   ; appears in the serial
        je     on_char          ; input buffer

        cll     al,[bx]          ;interrupts off
        mov     bx,inc           ;read a byte from the buffer
        inc     bx,buffer_end    ; and advance the tail
        cmp     read_exit       ;wrap around to start of buffer
        jne     read_exit       ; if necessary
        mov     bx,buffer_start
        mov     buffer_tail,bx

read_exit: sti             ;interrupts on
        ret

read_char endp

;
; DISPLAY_CHAR writes the character in AL to the screen buffer.
;
display_char proc    near
        mov     bh,0bh           ;$106 TTY function
        mov     bh,bh
        ldt     10h
        ret

display_char endp

;
; SEND_CHAR writes the character in AL to COM1.
;
send_char proc    near
        push     ax              ;save character code
        mov     dx,uart_addr
        add     dx,5
        mov     al,dx           ;loop until Transmit
        test    al,20h          ; holding register
        js     send_loop        ; is empty

        sub     dx,5            ;then output the character
        pop     ax
        out     dx,al
        ret

send_char endp

;
; READ_COM handles interrupts generated by COM1 when a byte of data
; is received. Data is read from the UART's receive buffer register
; and stored in a FIFO queue.
;
read_com  proc    far
        push     si              ;save registers
        push     bx
        push     dx
        push     dx

        mov     ax,date          ;establish 06 addressability
        ds,ax
        mov     dx,uart_addr     ;make sure OEAR is clear
        add     dx,3
        in      al,dx
        and     al,07Fh
        out     dx,al

        mov     dx,uart_addr      ;read the character
        in      al,dx

        mov     bx,buffer_head    ;calculate next head position
        mov     dx,bx
        inc     dx
        cmp     dx,buffer_end    ;to make sure the buffer
        jne     on_wrap         ; isn't full

        mov     on_wrap          ;
        mov     dx,buffer_start
        cmp     dx,buffer_tail
        jne     exit_int        ;exit if buffer is full

        mov     [bx],al          ;insert character in buffer
        mov     bx,buffer_head   ;advance head pointer

exit_int:  mov     al,10h         ;align EOI to the 8258
        out     INTA81,al
        sti             ;interrupts on

        pop     dx              ;restore registers
        pop     dx
        pop     bx
        pop     ax

        lret                ;return from interrupt

read_com  endp

code      ends
main      ends

```



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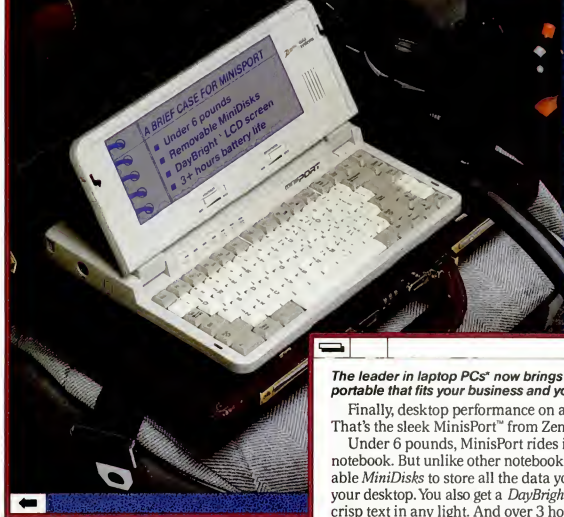


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## Lab Notes

from the buffer, READ\_CHAR temporarily clears interrupts and keeps them disabled during the critical time interval when it manipulates buffer pointers.

### NEXT UP: OS/2

DOSTERM is about as uncomplicated as a functioning interrupt-driven serial communications program can be. Although it works, it's of limited practical use since it lacks the features we expect from commercial communications packages: the ability to adjust line settings on the fly, to dial phone numbers, to upload and download files, and more. What it does is to illustrate just how such programs are implemented under DOS. If you've never seen it done

The DOSTERM  
program illustrates  
how functioning  
interrupt-driven  
serial  
communications  
programs are  
implemented under  
DOS.

before, it may seem a daunting task even to try. Once you know how, you can see that a few cookbook routines are all that you need to get started.

In the next Lab Notes, we'll take a look at the OS/2 communications environment and see how DOSTERM can be adapted to OS/2. You'll find that OS/2's support for serial I/O is much richer, making programs easier to write. Many common communications functions are handled automatically, including input and output stream buffering, RS-232C handshaking, and XON/XOFF flow control. And since standard OS/2 API functions are sufficient to access the driver, programs can be written in C as easily as in assembly language.

Equivalent code listings are thus simpler, shorter, and more concise, which is one indication that the greater portion of the load is being carried by the operating system, not by the application program running on top of it.

More importantly, the OS/2 COM driver works completely in the background and delivers all the functionality needed by commercial-quality programs. The multithreaded programming techniques avail-

able in OS/2 eliminate the code serialization endemic to DOS applications. This shifts the burden of arbitrating between input requests generated at the UART level and output requests generated at the keyboard—for example, from the application to the operating system. It's an exciting prospect for the next issue! ■

Jeff Prosis is a contributing editor of PC Magazine.

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by  
Michael J. Mefford

# Utilities

Everyone has a wish list for DIR. I've often thought that DIR should not only be able to compare two directories on-screen, but should then let me update the second with appropriate files from the first, right on the spot. DIR won't do this, of course; but *PC Magazine's* newest utility, DIRMATCH, will.

DIRMATCH displays the filenames of your source and target directories in an alphabetical, scrollable format, complete with size, date, and time information. Matching filenames appear side by side, with the more recent file highlighted. A movable inverse-video highlight bar lets you pick which file or files you want to copy or move, and at the touch of a key DIRMATCH then automatically updates the target directory with the selected files.

One of the things I do routinely, for example, is back up my day's work onto a floppy. By using DIRMATCH to compare my hard disk's work directory and the floppy, as shown in Figure 1, I can instantly see which files I've changed during the day. Then I can painlessly back up only those I choose.

Also, when you get an upgrade of a favorite application, you probably don't want to copy over the old version blindly. It's likely you have a configuration file—a *Microsoft Windows* WIN.INI, for example—that stores your customization defaults. COPY \*.\* would wipe that out. Many of the new version's support files—printer fonts or drivers, for example—probably either haven't changed or aren't needed. You need to look at both directories to see what you should copy from the update disk.

Successive DIR listings are no help. There are too many files, and they scroll off the screen too quickly. True, you could redirect the DIR outputs to your printer, or you could use a straight directory comparison utility. But while that would let you examine the listings at leisure, you'd then have to copy perhaps a dozen files individually. Now there's a better way.

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## UPDATE YOUR DIRECTORIES WITH A KEYSTROKE:

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combines side-by-side  
directory comparisons  
with Mark/Copy/Move  
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.COM by downloading it from PC MagNet, as explained in the sidebar "DIRMATCH by Modem." The assembly language source listing, DIRMATCH.ASM, is printed here and is also available from PC MagNet, as is DIRMATCH.BAS, a BASIC program that automatically creates DIRMATCH.COM. To create an executable file using DIRMATCH.ASM requires a macro assembler and the following commands:

```
NAME DIRMATCH;  
LINK DIRMATCH;  
EXE2BIN DIRMATCH DIRMATCH.COM
```

### USING DIRMATCH

The syntax for DIRMATCH is

```
DIRMATCH source target [/D][/A]
```

The *source* and *target* arguments can be any two valid DOS DIR file specifications—drives, directories, or subdirectories. If in doubt about default paths, just specify the paths completely, as you would with DIR.COM. Your *source* and *target* can also use any combination of the DOS

question mark and asterisk wildcards. The three sample command-line entries below are illustrative, but do not begin to exhaust the possibilities.

```
DIRMATCH A: C:  
DIRMATCH NEWDIR OLDDIR  
DIRMATCH NEWDIR\*.BAK OLDDIR\*.BAK
```

DIRMATCH will prompt you if you forget to enter a filespec or enter one that doesn't exist. As with most well-designed utilities, the Esc key exits the program and returns you to the DOS prompt. Ctrl-C will abort program execution.

Note that DIRMATCH is designed to allow the user to compare *files* as well as directories. It is possible to enter

```
DIRMATCH \directory \file
```

or

```
DIRMATCH \directory\file.* \file.*
```

and compare the contents of \directory to the file named \file that may match one of the files in \directory.

You will need to be careful when comparing a directory or a file located in the root directory. C:\file will indicate a specific file rather than a subdirectory of the root if no such subdirectory exists. If this is the case, DIRMATCH will copy or move the files to the root, though the user may think it's copying or moving to the nonexistent \file directory.

A future release of DIRMATCH may provide a warning that \file does not exist as a *directory*; but for now users will need to look out for this possibility.

By default, DIRMATCH displays all selected files in both *source* and *target*. Adding the optional /D switch to the DIRMATCH command line restricts the display to Different files in the two sets. Similarly, the optional /A will show only files that are Alike. If you wish always to view only the Alike files when you load DIRMATCH, the easiest way to implement the

## Utilities

/A option is to use a batch file of the form

```
DIRMATCH V1 12 /A
```

In whatever matching mode you bring up DIRMATCH initially, the F1 key provides a three-way toggle you can use at any time to switch among All, Different, and Alike file displays. (Shift-F1 cycles the three display categories in the reverse direction.) Note that DIRMATCH does not do a byte-by-byte comparison, as does the DOS COMP (or MS-DOS FC) utility. DIRMATCH starts by looking for identical filenames, and if these match it compares their date and time stamps. While it is always possible for two files to have different contents and still have identical filenames and date and time stamps, such a contingency is too improbable for a utility such as DIRMATCH to consider.

Each of the three match modes displays

only those files that fall into its specific category. The number of files displayed (over several screen pages, if necessary) in the current match mode is shown at the top of the screen, next to the Source and Target Directory headings. Thus, for example, in the Alike files mode, if no files match, then no files will be displayed and the count will be 0.

### VISUAL CUES

When DIRMATCH finds files with matching names, it puts them side by side on the same display line. If their date and time stamps also match, the files are considered identical and both are highlighted. If the dates and times of the two files differ, the one with the more recent date is highlighted. When DIRMATCH finds a file without a matching filename in the other directory, that filename appears on a line by itself. Old files and nonmatching files are displayed with the normal intensity attribute (light gray in color). Thus you can see at a glance which files in the source and target directories are matching, which

are different, and which are most recent. The sidebar "Customizing DIRMATCH" gives DEBUG instructions for changing the color scheme for the visual cues.

An inverse-video highlight bar is used to select files for updating. The Up Arrow and Down Arrow cursor keys move the highlight bar a line at a time. The PgUp, PgDn, Home, and End keys, as you would expect, take you to the screen pages in the directory listings.

You can mark a file on which the highlight bar is resting for further action (copying or moving) by pressing either the keypad's plus key or the equals key on the top row of the keyboard. A small right arrow will appear next to the filename, marking it, and the highlight bar will automatically move down a line. Pressing the keypad's minus key or the minus key on the keyboard unmarks a previously marked filename. Holding down the shift key while pressing one of these keys moves the bar up instead of down. Pressing F2 marks all the source filenames at once, and F3 clears all marks. Trying to mark a blank source line simply advances the highlight bar.

### COPYING

To copy a file from the source to the target directory you needn't mark anything. Just place the highlight bar on the selected filename and press F4. You can copy a group of files by marking them before you hit F4. In either case you'll be asked to confirm your intent to update the target directory with a Y (yes) or to cancel with an N (no) or Esc before DIRMATCH starts copying. A successful copy is confirmed when an asterisk appears to the left of the source filename(s) and by an on-screen updating of the target directory listing.

Note that when copying a group of marked files, your single confirmation applies to the whole group. If you change your mind, you can abort the progress of a mass copy by pressing any key. Note also that only the marked files displayed in the current match mode can be copied. If you mark files in one match mode and toggle with F1 to another match mode, undisplayed marked files will not be copied. Your markings are not lost, however, as you'll see if you switch back to the previous mode. You'll need to do this before hitting F4.

### MOVING AND PRINTING

You can move source files to the target directory with the F5 key. F5 simply executes the F4 copy function and, if success-

DIRMATCH 1.0 (C) 1989 21st Communications Co., P. Magazine • Michael J. Perloff			
Source Directory		Target Directory	
File Name	Size	File Name	Size
ANSI	67225	3-08-89	8:40p
CO	75306	9-17-87	10:40p
CONFIG	42047	11-22-88	8:10p
CONVERT	22333	1-29-89	9:51p
DIRMATCH	91310	4-14-89	4:00p
DIRMATCHES	37493	3-10-88	4:16p
DR	64916	6-26-87	7:06p
DRAW	34857	1-22-87	12:06a
FORTEDIT	58577	4-22-89	4:13p
HELP	33183	8-03-87	8:55p
HOMO	18687	4-12-89	7:29p
HOUSECTL	30411	1-14-89	5:53p
PLAY	22061	1-29-87	7:12p
REMEMBER	46524	3-27-87	8:25a
RH	88195	9-30-88	9:34p
RUN	21627	10-14-87	9:43p
SCANDIR	28585	11-16-86	10:24p
SMOOTH	46828	10-16-88	3:57p
TOUCH	30263	11-30-87	12:53a
XPANDISK	40070	7-29-88	11:27a

Figure 1: In this screen shot, DIRMATCH displays the author's working D: ASM directory and that of a backup disk in the A: drive. The complete listings are shown, since the All files mode is highlighted next to the F1 in the menu at the bottom of the screen. There are 20 files in the source directory and 19 on the floppy disk in the target A: drive, and the blank line shows that the missing file on the backup disk is SCANDIR.ASM. Note also that the DIRMATCH.ASM backup in the A: drive listing is not highlighted, so it is not the up-to-date version. With the inverse highlight bar on DIRMATCH.ASM in the source directory, pressing F4 will copy the new version into the A: drive. After copying, the low intensity attribute of DIRMATCH.ASM in the A: listing will become high intensity, matching that in the source directory. That clue, with the asterisk that will appear next to DIRMATCH.ASM, will indicate that the file was updated.

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## Utilities

ful, deletes the files from the source directory. Move has one rule, however: if the source file already exists in the target directory, the move will not occur; Move will not copy over a file with the same name, regardless of its date. If you want to disable this move-over-existing protection, see the "Customizing DIRMATCH" sidebar.

Pressing F6 executes the DIRMATCH Print function. The entire listing, not just the current screen, is printed out. F6 ignores the current match mode and simply prints all filenames as if it were in the All files mode.

Ideally, highlighted (that is, matching) filenames on the display would appear in boldface on the printout. The variety of printer control codes makes boldface impossible to implement generically, however. Instead, DIRMATCH prints a greater-than sign (>) to the left of highlighted filenames. (The small right arrows that indicate marked files on the display do not appear on printouts and should not be confused with these greater-than signs.) While this solution is adequate, if you'd like to add more-elegant printer enhancements to your listings, the sidebar "Customizing DIRMATCH" provides the necessary DEBUG instructions.

### ADDITIONAL FEATURES AND CAVEATS

DIRMATCH supports any number of display lines, including the popular 43-line EGA and 50-line VGA modes. A minimum of 64K of free RAM is needed to run DIRMATCH, and a maximum of 1,423 filenames can be accommodated in a single directory listing.

DIRMATCH leaves all critical error-handling problems to DOS. Thus, if you try to copy when the drive door is open or print when the printer is off, DOS will inelegantly grace the DIRMATCH screen with one of its Abort, Retry, Fail messages. You can recover from the error by correcting the problem and hitting Retry. Selecting Abort will not only cancel your copying or printing activity, but will also exit from DIRMATCH and return you to the DOS prompt.

When filenames in the two directories don't match, there will be holes in one listing or the other, and these can even amount to entire blank pages. It may thus seem that there are files missing from one

of the directories when they are actually on a succeeding page. Be sure to page down through the listings and use the file counts displayed at the top of the screen as a clue to whether there are additional files on another page. Also keep in mind that the file count displayed at the top of each listing is not the total number of files in each directory, but rather the number of files that meet the current file-matching criterion.

## CUSTOMIZING DIRMATCH

by Michael J. Mefford

The following instructions will enable you to customize the color scheme used by DIRMATCH and enhance the printer dump of its listings. Enter

DEBUG DIRMATCH.COM

You're now ready to modify DIRMATCH.COM. If you make a mistake, abort the editing process by entering Q. After entering any modifications, enter

M  
Q

making DEBUG Write to disk and Quit.

### COLOR SCHEME

Use DEBUG's E (Enter) command to replace the default values shown in Figure A with the hexadecimal color value desired for the individual sections of DIRMATCH's display.

For example, to change the Recent files attribute from 1Fh (white on blue) to 1Eh (yellow on blue), enter

E D8A 1E

### PRINTER ENHANCEMENTS

You may enter up to six printer control codes (12 hex bytes) for each type of filename: recent and nonrecent. Most printers need only two codes, but laser printers may require more.

The following DEBUG instructions eliminate the greater-than sign that DIRMATCH uses as a default to mark recent filenames and allow you to enter the codes needed to print those filenames with emphasized print instead:

E 345 aa bb cc dd ee ff gg

DIRMATCH does not display hidden and read-only filenames. It is very unlikely that your target directory contains a read-only file with the same name as that of a normal file in the source directory. If it does, however, and you try to copy the source file, the procedure will mysteriously fail. (DOS won't let you copy over a read-only file.) DIRMATCH provides only a generic "disk error" message for

Here *aa* is the number of codes you'll be entering and *bb* through *gg* are the codes (in hex) your printer needs to select emphasized, or bold print. For example, only two such codes (1B 45) are needed for Epson-compatible printers:

E 345 02 1B 45

To cancel emphasized printing, you follow a similar schema:

E 34C aa bb cc dd ee ff gg

As before, *aa* is the number of codes and *bb* through *gg* consist of up to six printer codes. Again, there are only two codes (1B 46) to enter for Epson-compatible printers:

E 34C 02 1B 46

The HP LaserJet codes for turning bold on and off using the resident Courier font are 1B 28 73 33 42 and 1B 28 73 30 42, respectively. Therefore, the two DEBUG E instructions for LaserJet-compatible printers are

E 345 05 1B 28 73 33 42

E 34C 05 1B 28 73 30 42

### DISABLE MOVE CHECK

By default DIRMATCH will not allow you to Move (F5) a file to a directory in which the filename already exists. If you want to remove DIRMATCH's move protection, enter

E A94 EB

Now if you select F5, DIRMATCH will copy over existing files in the target directory of the same name and, if successful, delete the source file. ■

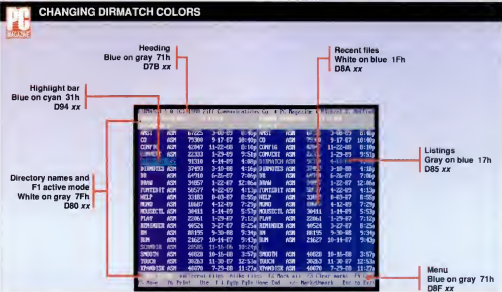
this and any other disk operation failure. Fortunately, such a coincidence of files on your source and target directories is likely to be exceedingly rare.

DIRMATCH doesn't list the names and contents of subdirectories below the level of the directories you tell it to display. You can imagine how difficult it is to put all the branches of a directory and their filenames into a single listing.

One final restriction (a protection, actually) will quickly become obvious when you start working with DIRMATCH. You can copy or move only from the source directory to the target directory, that is, from the directory displayed on the left to the one displayed on the right. If you want to copy in the opposite direction, you will have to exit DIRMATCH and reenter the filespecs in the opposite order.

#### HOW DIRMATCH WORKS

DIRMATCH uses a one-word field in the filename record to hold the display order of the entry. It is set to -1 if a filename does not satisfy the current matching mode criteria and should not be displayed. This situation occurs only in Different or Alike file modes; All files mode displays all filenames. If the filename is to be displayed, then its display order number represents



You can use DEBUG to change DIRMATCH's default colors. Here the different areas of a DIRMATCH screen are labeled with their default colors and the color values in hex, along with their DEBUG code locations. In this version of DIRMATCH, the variables (xx) in the DEBUG

code are equal to the default color settings indicated. To change an area's default colors (background and foreground), simply choose from the list of available colors below and substitute the corresponding values at the appropriate location.

#### Dark colors

Black	0
Blue	1
Green	2
Cyan	3
Red	4
Magenta	5
Brown	6
Light gray	7

#### Light colors

Dark gray	8
Light blue	9
Light green	A
Light cyan	B
Orange	C
Violet	D
Yellow	E
White	F

When choosing a color combination, remember that the first x represents the background color and the second x represents the foreground color. Using a light color as a background color will result in blinking characters.

**Figure A:** To change the default color scheme used by DIRMATCH, use DEBUG's E command and replace xx in the top part of this figure with the values for the color combinations you've selected. For example, if you wanted to change the heading from blue on light gray to blue on cyan, you would simply change the value at location D7B from 71h to 31h.







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## Utilities

## DIRMATCH.ASM

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[illegible]

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Michael J. Mefford

## DIRMATCH Command

September 26, 1989 (Utilities)

### Purpose:

To display two scrollable, alphabetized directory listings side by side with the more recent of matching filenames highlighted; to provide mark, copy, and move facilities to update the target directory with one or more selected files from the source.

### Format:

**DIRMATCH source target [/D] [/A]**

### Remarks:

The *source* and *target* may comprise any combination of drives, directories, or subdirectories (with optional \* and ? wildcards) valid for the DOS DIR command. The user will be prompted for target and source directories if his entry is incorrect. By default, DIRMATCH displays all files in the two directories. The optional /D and /A switches restrict the display to Different and Alike files, respectively. The on-screen display, together with the number-of-files counters, can be cycled through All, Different, and Alike modes with F1; Shift-F1 cycles in reverse. Pressing Esc exits the utility. Ctrl-C will abort the program operation.

An inverse-video selector bar shows the current position in the listings, and may be moved with the Up Arrow, Down Arrow, PgUp, PgDn, Home, and End keys. When the selector bar is on a filename, pressing the plus key on the keypad or the +/- key on the keyboard marks the file for further action. Pressing the minus (-) key on the keypad or the \_/- key on the keyboard unmarks a marked file. F2 marks all files; F3 clears all marks.

A file under the selector bar or a group of marked files can be copied from source to target directories by pressing F4. A confirming prompt is provided. Similarly, pressing F5 moves a file or marked group by first copying and then deleting file(s) from the source. While older files can be copied (F4) to the target directory, by default F5 will not move them. (See Customization Note).

Pressing F6 prints a list of all files, with more recent matching filenames identified with a greater-than sign. DIRMATCH supports any number of screen display lines, including 43-line (EGA) and 50-line (VGA) modes. It can display up to 1,423 filenames in its listings. Hidden and read-only files are not displayed. DIRMATCH requires 64K free RAM in order to run.

**Customization Note:** A sidebar to the original article provides DEBUG instructions for changing the display colors, for removing the move-over-existing file protection, and for adding printer control codes to display highlighted files in boldface rather than with a greater-than sign.

## DIRMATCH.ASM

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```

JMS      MERIDIEM
SUB      AX,L3          ;if yes, adjust.
CMP      CNP            ;midnight?
JMS      MOV_MIDNIGHT   ;if yes, adjust.
MOV      AX,L3          ;assume leading zeros.
MOV      CX," "
CALL     STORE_WORD     store it.

MOV      AX,D0         ;retrieve time.
MOV      CX,D9         ;shift to midnight bits.
SHR      AX,CX
AND      AX,BFFFFFFF    ;mask off all but minutes.
MOV      CX,CX
POP      D0             ;retrieve hours.
MOV      CX,D9         ;assume PM.
JNC      J1            if it PM
JAN      PM            PM
MOV      CX,"A"        ;if AM, AM.

FM:       CALL     STORE_WORD     ;store it.
INC      D1            ;pointer past mark.
MOV      AX,DATA_FILE_DATE
STORE    DATA           ;store date in DOS format.
MOV      AX,DATA_FILE_TIME
STORE    TIME            ;store time in DOS format.
INC      D1            ;swap pointer past DATA_OFFSET.
INC      D1
REP      EB            ;Done here.

;-----
; Converts a two byte hex number to decimal followed by delimiter.
; INPUT: AX = hex number. BL = flag. CH = delimiter character to follow.
; CH = 0 if no extra are to be stored. CL = 0 if leading zeros ignored.
; BH points to place to store.
; BH points to place to store.

STORE_WORD: STB      BC              ;Write by mem.
ADD      ADI,"BB"                 ;Convert to ASCII.
CMB      CNP                      ;Display leading zero?
JZ       SFONE_TY                  ;If yes, store as is.
CMP      ADI,"0"                   ;Is it a leading zero?
JNZ      SFONE_TY                  ;If so, store it.
MOV      AL,SFONE                ;else, store a space.

STORE_TY:  MOV      AL,CH           ;Also store delimiter character.
MOV      BYTES

```

```

Clib:      MOV     CX,CX                ;Top left corner.
           MOV     DX,0000
           MOV     SI,00 - 1
           MOV     AX,0000+PTR        ;Normal attribute.
           MOV     AX,6000            ;Scroll active page.
           INT     100
           RET

;=====
GET_PCR:   MOV     PTR PTR [SI],""     ;PCR doesn't preface directory
           INC     DI                  ; with slash so we must.
           MOV     DI,DI
           MOV     AX,67H              ;Set current directory.
           INT     210
           RET

CHANGE_DIR: MOV     AX,70H              ;Change current directory.
           INT     210
           RET

;=====
FIND_FIRST: MOV     CX,CX              ;Normal files.
           MOV     AX,000              ;Find first.
           INT     210
           RET

;=====
PRINT_STRING: MOV     AX,0              ;Print string via DOS.
           INT     210
           RET

;=====
DIRS_FIRST: MOV     SI,PTR PTR Vectors_Spec ;target drive.
           MOV     CX,"A" - 1
           MOV     AX,350              ;disk free space.
           INT     210
           MOV     SI,00
           MOV     DI,00
           MOV     CX
           INT     210
           ;structure per cluster + clusters
           ;result times bytes per cluster
           ; = available bytes.

DEFP:      MOV     AX,0000              ;Zero frequency divider.
           MOV     DX,120

```

**IN SOME  
WAYS  
WE DON'T  
STACK UP**

FROM 6 REMOTE PCs

**MODEMS** 

## "FUSS" BASED



NETWORK CONTROLLER IN EACH PC

摘要

**IN SOME  
WAYS  
WE DO!**

OL 1002 -  
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FROM 6 REMOTE PCs

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```

MOV AX,AX
MOV BX
MOV BX,AX

CALL DELAY
;Wait till clock rolls over.

MOV AL,Buf0
OUT 410,AL
JMP $+2
MOV AX,BX
OUT 410,AL
JMP $+2
MOV AX,AX
OUT 410,AL
IN AL,410
OR AL,3
JMP $+2
OUT 410,AL

CALL DELAY
IN AL,410
AND AL,BUF 3
JMP $+2
OUT 410,AL
RET

;-----
DELAY: PUSH DS
MOV AX,400
MOV DS,AX
MOV AX,CB:[BX]
MOV DX,CB:[BX]
CMP DX,AX
JE NEXT_BUF
PUSH NEXT_BUF
RET

;-----
BID_CURSOR: MOV DS,BUF0
INB DS
INB DS
MOV BL,BL
RET

;-----
SET_CURSOR: MOV BX,00
MOV AX,2
OUT 100

```

```

;#713 countdown.
;Wait till clock rolls over.
;Channel 2 speaker functions.
;#713 mode control.
;10 delay.
;Retrieve countdown.
;Channel 2 led.
;Channel 2 RES.
;Port B.
;Turn on speaker.

;Delay one second.
;Get Port B again.
;Turn speaker off.
;Done.

;Preserve data segment.
;Point to $B00 data segment.
;Retrieve timer low.
;Retrieve timer low.
;Have we timed out?
;If not, wait until second up.
;Restore data segment.

;-----
EVEN
DATA
SOURCE_POINTS = STA + SIZE MATCHING
COUNT_DIB = SOURCE_POINTS + SIZE MATCHING
SOURCE_EPIC = COUNT_DIB + SIZE LENGTH
SOURCE_FILE = SOURCE_EPIC + SIZE LENGTH
TARGET_EPIC = SOURCE_FILE + SIZE LENGTH
TARGET_FILE = TARGET_EPIC + SIZE LENGTH
USER_INPUT = TARGET_FILE + SIZE LENGTH
SOURCE_NAME = USER_INPUT + 14
SEARCH_POINTER = SOURCE_NAME + 66 + 256
SOURCE_OFFSET = SEARCH_POINTER

TEXT
ENDS
END START

```

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## Utilities

the logical line on which it will appear, counting from the top of the listing.

The high bit of the display order word is set if the filename is to be shown in high intensity, signifying a more recent file. This dual function works, since the maximum number of filenames per listing is 1,423. The high bit of the display order word can be ignored without affecting the display order value.

The display orders are assigned according to the rules of the match-mode algorithms, shown in Figure 2. When updating the display (after the user presses a cursor key, for example) DIRMATCH starts

from the top and searches through the listing records for a filename with a display order corresponding to the number of the current line to be displayed. The listings are kept in numerical display order. Thus, if DIRMATCH is looking for the entry for the third line, for example, and it finds the fourth, then the program can assume there is no third entry. It displays blanks for that part of the line, meaning there is no match for the file in the other directory.

The filename records include the date and time in expanded ASCII format as well as in the original disk directory compressed double-word format. The first is used for the display. The second is used to compare date and time stamps when matching filenames; this simplifies the handling of a.m. and p.m. time compari-

sons. You might find the selection sort algorithm DIRMATCH uses to alphabetize the listings of interest. This section of the code and its accompanying comments are at the SORT: label in the assembly listing.

### SUMMARY

Charles Petzold's DIRCOMP and my own SCANDIR, which appeared in the January 27, 1987, issue, give you side-by-side directory displays. Neither program includes the mark, copy, and move facilities you need for one-stop selective file updating. You should find DIRMATCH a welcome addition to your utility toolkit for directory file maintenance. ■

*Michael J. Mefford is a contributing editor of PC Magazine.*



## HOW DIRMATCH ARRANGES ITS SCREEN DISPLAYS

### ALL FILES

Algorithm:

If source < target  
then source gets line counter  
Else  
target gets line counter:  
increment line counter

### SOURCE LISTING TARGET LISTING

Display Order	Filename	Display Order	Filename
1	AARDVARK	2	BABOON
4	EMU	3	CAT
6	ZEBRA	4	EMU
		5	FOX

Source Directory	2 files	Target Directory	3 files
AARDVARK	6232 6-30-89 3:48p	BABOON	4145 6-30-89 3:38a
EMU	7253 6-30-89 3:38a	CAT	2071 6-30-89 3:38a
ZEBRA	4114 6-30-89 3:48p	FOX	1236 6-30-89 3:37p

### DIFFERENT FILES

Algorithm:

If source = target  
then source order = -1  
and target order = -1  
Else  
If source < target  
then source order gets line counter  
else  
target order gets line counter:  
increment line counter

1	AARDVARK	2	BABOON
-1	EMU	3	CAT
5	ZEBRA	-1	EMU
		4	FOX

Source Directory	2 files	Target Directory	3 files
AARDVARK	6232 6-30-89 3:48p	BABOON	4145 6-30-89 3:38a
EMU	7253 6-30-89 3:38a	CAT	2071 6-30-89 3:38a
ZEBRA	4114 6-30-89 3:48p	FOX	1236 6-30-89 3:37p

### ALIKE FILES

Algorithm:

If source = target  
then source order gets line counter  
and target order gets line counter:  
increment counter  
Else  
If source < target  
then source order gets -1  
else  
target order gets -1

-1	AARDVARK	-1	BABOON
1	EMU	-1	CAT
-1	ZEBRA	1	EMU
		-1	FOX

Source Directory	3 files	Target Directory	3 files
AARDVARK	6232 6-30-89 3:48p	BABOON	4145 6-30-89 3:38a
EMU	7253 6-30-89 3:38a	CAT	2071 6-30-89 3:38a
ZEBRA	4114 6-30-89 3:48p	FOX	1236 6-30-89 3:37p

**Figure 2:** The display order field for each entry stores the results of the matching algorithm for the active mode. A filename is considered less than (<) another if it appears earlier in the alphabet. Filenames that are not to be displayed are marked with a -1. A filename for the source is compared with a filename from the target from top to bottom until every filename is either assigned a display order or a -1.

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by  
Charles Petzold

# Environments

During the months of April and May, Microsoft released its new technical documentation and programming tools for OS/2 1.1. The good news on this front is the price: \$229.85. Assuming you have OS/2 1.1 and the Microsoft C Compiler 5.1, \$229.85 is all you need to begin writing Presentation Manager programs.

You can spend more money if you want, but \$229.85 gets you the essentials. Microsoft has even unbundled the programming references and tools, so you can pick and choose what you want to buy now and what you don't need yet. Such a choice, of course, requires that you know what the various components are—that's what I'll tell you about in this column.

**THE PROGRAMMER'S REFERENCE BOOKS** Let's begin with the technical documentation. It consists of three softcover volumes collectively titled *Microsoft OS/2 Programmer's Reference*. These books are the size of trade paperbacks (7½ by 9¼ inches); they are available in many bookstores that carry computer books.

Publishing the technical documentation as regular books is not a new idea. Apple's *Inside Macintosh* series and the Commodore Amiga references are also available in bookstores, for example. I'm glad to see Microsoft take the same approach. This way, for a few bucks in books, people can see what they'll be getting into without making a major financial commitment.

Volume 1 (\$29.95, 740 pp.) of the *Programmer's Reference* consists of 56 chapters that present an overview of OS/2 concepts and its application program interface (API). The emphasis is on the Presentation Manager, with about 350 pages devoted to windowing and the user interface and 200 pages more to the Graphics Programming Interface (GPI). The book concludes with 150 pages on the OS/2 kernel functions.

Volume 2 (\$29.95, 564 pp.) is principally a reference manual of the Presentation Manager functions. The 7 Dev functions, 224 Gpi functions, and 239 Win functions are covered in alphabetical or-

Microsoft's new,  
attractively priced  
Presentation Manager  
Programming Tools  
give you all you  
need to learn OS/2  
programming.

der. This volume also documents the Presentation Manager messages, data types, macros, structures, and file formats.

Volume 3 (\$19.95, 430 pp.) is a similar reference for the OS/2 base system. It provides documentation for the 153 Dos functions, 18 Kbd functions, 23 Mou functions, and 55 Vio functions, as well as for IOCTL function calls, data structures, and file formats.

The split between Volumes 2 and 3 is a good one. If you want to stay away from the PM for now, concentrating on OS/2 character-mode programming instead, you can put off buying Volume 2.

#### IBM DOCS AND MICROSOFT DOCS

The only alternative to the three volumes of the *Microsoft OS/2 Programmer's Reference* is the \$200 IBM OS/2 1.1 *Technical Reference*, which consists of seven 8½-by-11-inch volumes containing a total of over 2,600 pages.

The biggest difference between the IBM and the Microsoft documentation is that IBM includes information about writing device drivers and presentation drivers. (*Presentation drivers* are dynamic link libraries that handle screen and printer graphics.) Under the accurate assumption that most programmers do not need this information, Microsoft sells a separate tool-

kit for writing device drivers.

I'm not sure yet whether I prefer the IBM or Microsoft function call references. IBM's function reference is a lot airier and cleaner than Microsoft's. It's easier to find things because each function begins on a new page. IBM is also much better at listing possible error conditions for the functions. The IBM indexes are much better than those in the Microsoft books.

On the other hand, the Microsoft books are smaller and easier to hold and handle. And in Volumes 2 and 3, the OS/2 function parameters are documented using the C data types. If you use the IBM books, you often need to consult a separate volume that describes the C bindings. This is a real nuisance, and it's the biggest problem I find with IBM's approach.

IBM and Microsoft are not quite consistent in what functions they document. For example, the `DosQSysInfo` function is documented by Microsoft but not by IBM. As with OS/2 1.0, IBM documents five `DosPFs` functions not covered by Microsoft. Both IBM and Microsoft document 239 Win functions, but they aren't the same 239. IBM includes four functions (`WinSetMsgInterest`, `WinSetClassMsgInterest`, `WinMakeRect`, and `WinMakePoints`) that are not in the Microsoft books, and Microsoft includes four functions (`WinFormatFrame`, `WinGetMaxPosition`, `WinIsPhysInputEnabled`, and `WinLoadMessage`) that are omitted from the IBM books.

IBM doesn't document `GpiSetCharDirection` and `GpiQueryCharDirection` (probably because these functions are not yet functional), though Microsoft does. But IBM documents 16 `Spi` (spooler) functions and a collection of `Gre` (graphics engine) functions that Microsoft ignores, probably because these functions are important to presentation drivers, but rarely (if ever) used by application programs.

#### THE PRESENTATION MANAGER SOFTSET

Near the end of each of its *OS/2 Programmer's Reference* books is an advertisement

## Environments

for the *Microsoft OS/2 Presentation Manager Softset*, a \$150 software companion to the books. This is a collection of the essential OS/2 and Presentation Manager programming tools, contained in two high-density diskettes with an accompanying 197-page manual.

The *Softset* includes several command-line utilities that run under both OS/2 and DOS: LINK.EXE, RC.EXE (the resource compiler), BIND.EXE, EXEHDR.EXE, and a few others. It also contains three Presentation Manager programs (ICONEDIT.EXE, FONTEEDIT.EXE, and DLGBOX.EXE); C header files that contain the OS/2 function declarations; the OS2.LIB import library; and CodeView 2.3, which is suitable (but barely so) for debugging OS/2 and Presentation Manager programs.

Thus, if you have OS/2 1.1 and the Microsoft C Compiler 5.1, an investment of \$79.85 for the three books and \$150 for the *Softset* gives you what you need to write Presentation Manager programs.

### IBM HEADS AND MICROSOFT HEADS

Just as there are differences between the IBM and Microsoft documentation, there are also some differences between the IBM and the Microsoft OS/2 header files. (IBM distributes the OS/2 header files as part of its \$787 *OS/2 1.1 Programmer's Toolkit*.) The most startling difference is that *Microsoft OS/2 Presentation Manager Softset* contains 16 header files; IBM's *OS/2 1.1 Programmer's Toolkit* has 24.

Two of the header files you get with the IBM *Toolkit* but not with the Microsoft *Softset* are PMDDI.H and PMDDIM.H. The DDI stands for *device driver interface*. These files define functions and structures that are used when making direct calls to the PM graphics engine. Presentation Manager application programs rarely use this interface, but it's important if you're writing graphics presentation drivers for OS/2.

The IBM version similarly contains PMSPL.H, which contains declarations for 16 functions that begin with the Spl (spooler) prefix. Again, these are functions not normally used by applications.

IBM also includes DOSCALL.H, DOSCALLS.H, SUBCALLS.H, ERROR.H, and ERROR2.H. Veteran OS/2 programmers will recognize these as the

original header files IBM distributed with its *OS/2 1.0 Programmer's Toolkit*. They declare the OS/2 1.0 functions using uppercase function names and are provided for compatibility with old source code. They should be avoided in new programs.

IBM includes yet one more header file not provided by Microsoft. This is SAA.PI.H, which limits the declaration of OS/2 functions to those that are part of the SAA portable subset. IBM intends to support this subset on its minicomputers and mainframes as well as on the PC. Normally, at the top of an OS/2 program you include the main OS2.H header file:

```
#include <os2.h>
```

If you want instead to restrict yourself to the SAA subset, you use

```
#include <saaapi.h>
```

As you might expect, SAAPI.H is not very long. It merely defines the identifiers INCL\_SAADEFS, INCL\_NOCOMMON, and INCL\_WIN, and then includes OS2.H.

For its part, Microsoft supplies one header file not in IBM's *Toolkit*. This is BSEDEV.H, and it contains definitions of identifiers and structures that are useful when working with the DosDevIOCtl function. This will principally benefit communications programs.

### QUICKHELP AND SAMPLE CODE

When you buy *Microsoft OS/2 Presentation Manager Softset*, you'll also find an order form for additional software. For \$150 you can get the *Microsoft QuickHelp* program and about 2MB of sample OS/2 code.

I haven't seen the sample code yet, but I am familiar with *QuickHelp*. It's an OS/2 program that gives you on-line access to OS/2 documentation. This version of *QuickHelp* comes with files that contain all the material in the three volumes of the *Microsoft OS/2 Programmer's Reference*.

So, if you get the *Softset* and this \$150 add-on package with *QuickHelp*, and you're comfortable referencing the OS/2 documentation from your PC, you don't actually need to buy the books themselves. As I said, you can pick and choose.

### THE PROGRAMMER'S TOOLKIT

Of course, you may not want to pick and choose. You may want to pay one amount for everything in one simple box. In this

case, you probably want the *Microsoft OS/2 Presentation Manager Toolkit*. This package costs \$500 and includes everything I've discussed so far:

- The three volumes of the *OS/2 Programmer's Reference*

- *Microsoft OS/2 Presentation Manager Softset*, *QuickHelp*, and the sample code available with the purchase of the *Softset*.

The *Toolkit* also includes 2 hours of time on OnLine, Microsoft's electronic support system. (Microsoft estimates the value of this 2-hour introduction to OnLine at \$90.)

Also in Microsoft's *Toolkit* is a book I wrote, called *Programming the OS/2 Presentation Manager* (Microsoft Press, 845 pp.). The *Toolkit* further includes a companion diskette containing the source code

**Microsoft's Toolkit  
includes 2 hours of  
time on its  
electronic support  
system.**

for the 60 programs in the book. Some programmers have told me that they find the book useful in learning how to program for the Presentation Manager. Of course, the book is also available in bookstores for \$29.95; the companion disk can be ordered from Microsoft Press for another \$29.95.

### NO EXCUSES

The relationship between Microsoft and the aspiring OS/2 programmer got off to a bad start 2½ years ago, with the announcement of the *OS/2 Software Development Kit* at the outrageous cost of \$3,000. I'm delighted to see Microsoft take a completely different pricing approach with the *OS/2 Presentation Manager Toolkit* and its components. The technical references are easily available, and the essential tools are priced within the means of almost any programmer.

Of course, once the monetary burden is lifted, a burden of a different sort is imposed: programmers no longer have an excuse not to begin to wrestle with OS/2 and the Presentation Manager. ■



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by  
Ray Duncan

# Power Programming

The Intel 80386, and the personal computers and software products which are based on it, are a hot topic in the computer press these days. However, if you're a veteran DOS and Intel 8086/88 programmer who hasn't yet found time to study up on the unique characteristics that the 80386 has to offer, you may well be wondering what all the fuss is about. After all, your experiences with the Intel 80286 would lead you to expect little more from the 80386 than additional speed accompanied by some compatibility problems.

The 80386 is a *lot* more than a fast 80286, however. It's a true 32-bit processor with an enormous virtual-memory address space, flexible on-chip memory management, and pipelined execution. When running in its native mode, the 80386 has a far more powerful, regular, and efficient instruction set than those of its 8086 and 80286 predecessors. Perhaps most important, however, is the fact that the 80386 affords not only complete backward compatibility with the 8086, 8088, and 80286, but also permanent relief from the programming claustrophobia induced by their 64K segments. This aspect of the 80386 is summarized in Figure 1.

In this column, I'll try to show you why so many programmers—especially those who must implement compilers, operating systems, or very large and complex applications—are so excited about the 80386. Everything I say here, it should be noted, applies equally to the newly announced 80486. From a software viewpoint, the 80486 behaves just like an 80386, except that a numeric coprocessor is integrated right into the 486 chip and so is always available.

## THE MANY MODES OF THE 80386

When turned on or restarted, the 80386 (like the 80286) begins execution in *real mode*—essentially an 8086 emulation mode. In real mode, the 80386 can address only 1MB of memory; protection and virtual memory facilities are inoperative, and segment registers contain the familiar

Part 1 of a series on  
programming the  
80386 gives you an  
overview of the  
architecture of this  
exciting CPU and tells  
how you can start  
using its capabilities  
today.

physical paragraph addresses. Most machine instructions execute in fewer clock cycles on an 80386 than on an 8086 or 80286, however, and the 386 can also run at higher clock frequencies. In a word, when running plain-vanilla DOS and its applications, the main thing you gain with an 80386 is speed.

The 80386 can be switched into *protected-mode* operation under program control by setting up certain vital tables and descriptors and then changing a bit in the machine status word. Once protected mode is selected, a level of indirection is added by altering the 80386's address-mapping procedure. Each value in the segment register becomes a *selector*, which is an index to an entry in a descriptor table. The descriptor table contains the base address and length of a physical memory segment, segment attributes (executable, read-only, or read-write), and privilege information. When the 80386 is in protected mode, each time a program references memory, the hardware uses the associated descriptor to generate the physical address. The validity of the memory access is also checked simultaneously.

So far, of course, the 80386's protected-mode operation sounds a great deal like that of the 80286. But there are some very important differences between the two. The first is that a single segment on an 80386 can be as large as 4 gigabytes. That's a far cry from the 80286, whose maximum segment size—and thus the largest chunk of contiguously addressable memory—is the old 64K.

With the 80386, you can use a linear address space model (also referred to as a flat model) to write enormous programs in a very straightforward way. You simply create one huge segment, point all of the segment registers to its base, and then forget about segmentation from that point forward. And if you multiply the number of available selectors by the maximum segment size, you find that the 80386 has a potential virtual address space of an almost inconceivable 64 terabytes!

Moreover, unlike the 80286, the 80386 supports an optional added layer of address translation, called *paging*. When paging is enabled, the linear addresses produced by the hardware's interpretation of a selector and an offset can in turn be mapped onto physical memory in 4K chunks through page tables. This process is illustrated in Figure 2. Like descriptor tables, page tables are special data structures maintained by a protected-mode operating system and interpreted by the hardware. Paged virtual memory simplifies life considerably for the operating system's virtual-memory manager. Instead of rolling entire segments—which may be of any size from 1 byte to 4 gigabytes—between disk and RAM as a unit (segment swapping), the virtual-memory manager can deal with pages of a reasonable, fixed size (demand paging) and ignore segmentation issues altogether.

The 80386 can take on either of two distinct protected-mode personalities. It can run in a 16-bit protected mode, executing programs written for the 80286, or it can run in its native 32-bit protected mode; in the latter mode, it can execute applications

## Power Programming

written to take full advantage of the 32-bit 80386 architecture. The selection of 16- or 32-bit protected mode is controlled by a single bit in a table that is associated with the currently executing task. This means that an operating system can run both types of applications concurrently with essentially no extra effort.

For members of the "DOS forever" school of thought, however, the most exciting feature of the 80386 is its *virtual 86* mode. A protected-mode 80386 operating system can create special memory segments, each up to 1MB in size. Programs that run within these segments execute exactly as if they were running on an 8086/88 in real mode. Each such segment is called

a *virtual 86 machine* and each has its own address space, I/O port space, and interrupt vector table. Multiple virtual 86 machines will run simultaneously, each under the illusion that it is in complete control of the computer.

The crucial difference between real mode and virtual 86 mode is that memory-protection, virtual-memory, and privilege-checking mechanisms *remain in effect* when a virtual machine is running. Thus, a program executing in a virtual 86 machine cannot interfere with the operating system or damage other processes. If the program reads or writes memory addresses that have not been mapped into its virtual machine, or if it tries to manipulate I/O ports to which it has not been allowed access, an *exception* (a hardware interrupt) is generated, and the operating system regains control. At that point, the operating system's

exception handler can choose to terminate the process, carry out the operation on behalf of the process, or take some other appropriate action.

Virtual 86 mode, then, opens the door to safe multitasking of existing DOS applications—even of those nasty, ill-behaved programs that bang on I/O ports and twiddle bits in the video refresh buffer—in a fully protected environment. *Microsoft Windows/386*, *DESQview 386*, and the DOS Merge facilities of 80386 Unix all rely on the virtual 86 mode. Similarly, the 80386 version of OS/2 will exploit virtual 86 mode to run multiple MS-DOS applications, 16-bit protected-mode applications, and 32-bit protected-mode applications side by side.

### 80386 ARCHITECTURAL ENHANCEMENTS

From the application programmer's point of view, the 80386 running in 32-bit protected mode is a very different animal from an 8086 or 80286 running in that mode. Aside from 80386's enormous address space, these differences fall into three major categories:

- expanded register set
- augmented addressing modes
- improved instruction set

The 80386 has a set of eight 32-bit general registers: EAX, EBX, ECX, EDX, EDI, ESI, EBP, and ESP. It also has six segment registers: CS, DS, ES, SS, FS, and GS. As detailed in Figure 3, the 8- and 16-bit general registers of the 8086/88 and 80286 are subsets of the 32-bit general registers and can still be referenced. Note, though, that use of the 16-bit registers does incur some additional overhead in 32-bit protected mode.

By default, most 32-bit protected-mode register operations operate on 32-bit quantities and produce 32-bit results. As you would expect, however, the multiply and divide instructions can involve 64-bit quantities. For example, a register-register multiply accepts two 32-bit arguments and produces a 64-bit result; a register-register divide takes a 64-bit dividend and a 32-bit divisor and returns a 32-bit quotient and a 32-bit remainder. For many applications, this eliminates the need for floating-point arithmetic altogether.

The addressing modes provided by the 80386 offer a vast improvement over earlier Intel CPUs, especially in the area of indirect addressing. Whereas the 8086 and 80286 allowed only BX, DI, SI, and BP to be used as index and base registers, the 80386 can generate an effective address

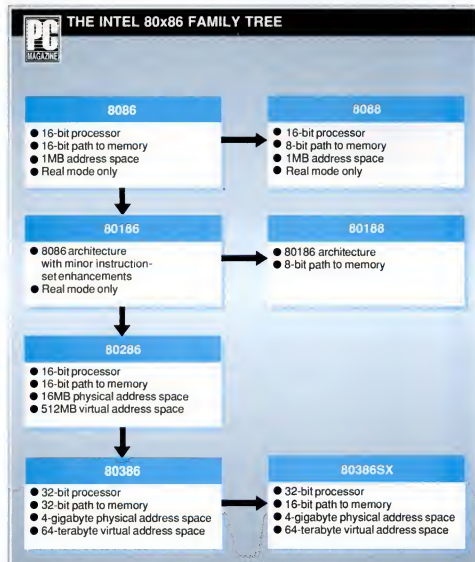


Figure 1: Although the 80386 is a true 32-bit processor, it retains full backward compatibility with its 8086, 8088, and 80286 forebears.

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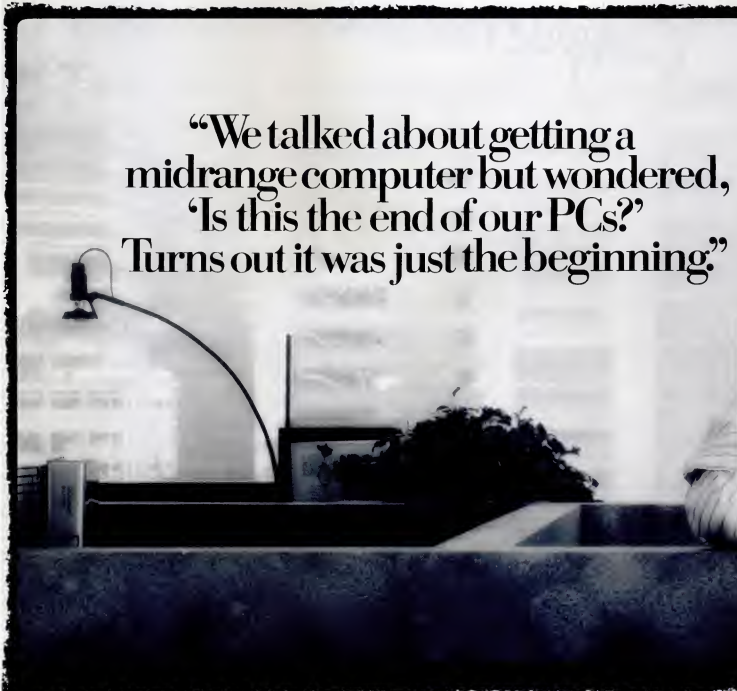
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## Power Programming

from any combination of one or two general registers, a displacement, and a scaling factor that can be applied to the contents of one of the registers. The scaling factor can be 1, 2, 4, or 8, which is certainly convenient for stepping through arrays of words, double words, or 64-bit floating-point numbers. For example, you can write the instruction

```
MOV EAX, [EDX*4+ESP+8]
```

which loads register EAX with the contents of the memory location addressed by the value in register EDX multiplied by four and added to the value in the ESP register plus eight. Note that the ESP register, while it still functions as the hardware stack pointer, can be used like any other register in the generation of indirect addresses.

The 80386's new or improved instructions fall into three general areas: bit manipulation, some new flavors of moves and jumps, and what may seem a rather odd (at first glance) collection of SET instructions.

For bit twiddling, the 80386 has six new instructions:

- BT (bit test)
- BTC (bit test and complement)
- BTR (bit test and reset)
- BTS (bit test and set)
- BSF (bit scan forward)
- BSR (bit scan reverse)

The first four of these instructions allow a bit in a register or memory to be tested and its state to be stored in the Carry Flag to control a subsequent conditional branch. The bit may then be left alone, reset (to zero), set (to one), or flipped to the opposite state.

The last two bit-manipulating instructions in the list above scan the bits of a 16- or 32-bit operand forward or backward to find the first nonzero bit. These instructions are useful in graphics routines or when maintaining allocation bitmaps for memory or disk space.

The conditional and unconditional jumps of the 80386 can take you a long way indeed: since they can have either an 8-bit or a 32-bit displacement (depending on the distance to the destination address), you can reach any location in a 4-gigabyte segment directly. Thus there's no need ever to avoid a conditional jump, as you

must on the 8086 or 80286, where conditional branches have a range of only -128 to 127 bytes. *Near* calls use 32-bit displacement, while *far* jumps and calls accept a selector and a 32-bit offset, which allow the destination to be anywhere in the 80386's 64-terabyte virtual-memory space.

The new move instructions might at first seem rather unimportant to you. There is a MOVZX instruction, which zero-extends an 8- or 16-bit source operand as it copies it to a 16- or 32-bit destination operand, and a MOVSB instruction, which sign-extends as it moves. Including these two instructions was a really thoughtful touch by the 80386 designers because they enable you to carry out operations that

would otherwise require extremely clunky code sequences. Thus, for example,

```
MOVSB EBX, EBX
```

sign-extends the 8-bit quantity in BH to 32 bits and leaves the result in EBX.

The family of SET instructions forces the contents of a byte in a register or memory to a value of either zero or one, based on the state of the CPU flags. The purpose of these instructions seems to have puzzled more than a few writers. An article in *Programmer's Journal*, for example, suggested that Intel offer a prize to anyone who could come up with a good use for the instructions. In fact, however, their intent is perfectly clear: to generate Boolean values

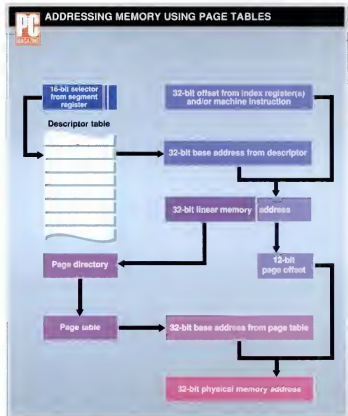


Figure 2: The diagram above shows the process used to address memory when paging is enabled in the 80386's 32-bit protected mode. The upper 13 bits of a selector are used to index an entry in a descriptor table. The base address from the segment descriptor is combined with a 32-bit offset from the instruction and/or index register(s) to form a 32-bit linear address. This linear address is then translated through a page table to derive a 32-bit physical memory address.

## Power Programming

(such as those used by C compilers) without the need for a conditional jump. Consider the C statements

```
int x,y;  
y = x < 0;
```

where y is set to a true flag if x is negative and to a false flag otherwise. Assuming x and y are register variables held in EAX and EBX, the corresponding machine code that first comes to mind will be something like this:

```
xor ebx,ebx ; assume false  
or  eax,ebx ; test sign of x  
jns label ; jump if x >= 0  
inc ebx ; make true flag  
label:
```

This code looks benign enough, but jumps and calls are very expensive on the Intel processors because they empty the instruction prefetch queue. They also incur an execution time penalty that is way out of proportion to what you would expect by counting the cycles documented in the Intel handbooks. The SET instructions allow you to write the same little sequence of code as

```
xor ebx,ebx ; assume false flag  
or  eax,ebx ; test sign of x  
sets bl ; flag=true if x<0
```

Naturally, when you are programming for the 80386, you can also use the machine instructions that were added in the 80286, such as *push immediate value*, *shift by count*, and the ENTER and LEAVE opcodes for creating and destroying stack frames. Although these instructions are rarely used in the course of normal DOS programming, they can make a very significant difference in code size and performance.

### 80386 PROGRAMMING TODAY

It's certainly no secret that Microsoft and IBM are already working furiously on an 80386-specific, 32-bit successor to OS/2. Software development kits for this system, including 80386 compilers, assemblers, linkers, and the like, will probably be available in the fourth quarter of 1989, and the retail version should appear in the fall of 1990. If 80286 OS/2 is even moderately

successful by that time, the 80386 version is almost certain to capture the market rapidly when it appears.

But what if you want to do something practical with the 80386 right now? Suppose that your application is suffering from memory starvation, uses huge data structures, is already being loaded in five layers of nested overlays, and generally cries out for a bigger and better CPU. The 80386 seems ideal and machines based on it are getting cheaper by the day, but how does one make sense of the chaotic situation in 80386 system software and put the processor to work properly without burning any bridges?

If you browse through the advertisements in your favorite technical magazines, you'll find that there are currently three basic categories of 80386-specific system software products: control programs (sometimes called virtual machine monitors); alternative operating systems; and so-called DOS extenders. Let's take a closer look at each of these categories.

For our purposes, we can immediately set aside the control programs, which are exemplified by *Windows/386* and *Quarter-*

deck Office System's *DESQview*. These programs, though they themselves run in the 32-bit protected mode of the 80386, do not support 32-bit protected-mode applications. Rather, they simply set up one or more virtual 86 machines, each with its own private address space, and run a single 16-bit DOS application in each. The applications can't communicate with one another and can't address extended memory directly.

As far as alternative operating systems go, there are currently four to choose from: Digital Research's *Concurrent DOS 386* and *Flex OS*; VM/386, from IGC (Intelligent Graphics Corp.); The Software Link's *PC-MOS/386*; and *80386 Unix* (from several vendors, including The Santa Cruz Operation).

*80386 Unix* is definitely a viable candidate as an operating system—if you can live with its huge memory and disk overhead, baroque user interface, oblique documentation, and all of its other little idiosyncrasies. You can buy *80386 Unix* off the shelf, however, and it comes with a complete set of programming tools (albeit crude ones, by DOS standards). And it will let you write monstrously big multitasking, virtual-memory applications. The Unix market—although considerably smaller than the DOS and (projected) OS/2 markets—is growing, and it has the advantage of being a much less price-sensitive market.

What about the other alternative operating systems? The indifferent, me-too character of Digital Research's products, along with my personal experiences with that company's abysmal product support, rules them out immediately as far as I'm concerned. *PC-MOS/386* and *VM/386* have managed to survive to this day (somewhat to my amazement), but I'm dubious about their long-range prospects. Both seem to me essentially niche products that are taking advantage of a very limited marketing window. They can multitask DOS applications perfectly well, but their viability as a platform for true 32-bit applications is doubtful.

The third category is made up of the DOS extenders. In simplest terms, a DOS extender is a supervisor program that establishes a 32-bit protected-mode environment on behalf of an application, but that still lets that application use DOS for file services and I/O. A DOS extender loads an application into extended memory, switches the CPU into protected mode (appropriately setting up the various descrip-

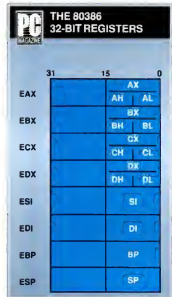


Figure 3: In writing applications, programmers should note that, in the 80386, each of the familiar 8086, 8088, and 80286 registers is extended to 32 bits. The names of the extended registers begin with an E to distinguish them from the 16- and 8-bit register subsets.

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## Power Programming

tor tables and registers), and then gives control to the application.

When the application makes a request for an operating-system service (such as reading a file), the DOS extender intercepts the request, switches the machine back into real mode, performs any necessary address translation or copying of data from extended memory into conventional memory (that is, below the 640K boundary), then passes the request on to DOS. When DOS returns from the function call, the DOS extender switches the machine back to protected mode, again performs any address translations that might be needed, and hands the results of the operation back to the application.

I'm currently aware of three sources for 80386 DOS extenders: IGC, A. I. Architects, and Phar Lap Software. The prod-

ucts are probably best advised to steer clear of the IGC product because it has not been updated for compatibility with the Phar Lap/Quarterdeck Virtual Control Program Interface (VCPPI), which allows 80386-aware programs to work together cooperatively.

A. I. Architects sells developers' kits for 80286- and 80386-specific DOS extenders, called *OS/286* and *OS/386*, respectively. Both these products contain support for multitasking and interprocess communication that is not offered by the Phar Lap or IGC DOS extenders.

Phar Lap's DOS extender, called *RUN386*, is part of its 80386 assembler/linker package. A Virtual Memory Manager you can use with your applications is available as an option. My own company has released an 80386 product that incorporates *RUN386*, and I have found Phar Lap's software products to be stable and reliable and their technical support outstanding.

Why should you choose a DOS extender instead of switching to another operating system such as *80386 Unix*? One very good reason is that you can continue to run all of your favorite DOS-based text processors, word processors, database systems, telecommunications programs, and the like during the development process. Another good reason is that, since the DOS extenders all use DOS for file system services, you will not have to reformat your fixed disk or have two incompatible partitions.

This last reason for using a DOS extender instead of *80386 Unix* has a great deal going for it. If you create an application for resale that incorporates a DOS extender, you can distribute it on DOS disks and through normal DOS software channels just by marking it "80386-based PC required." The user can install and run the program in the usual way. Indeed, he usually won't even be conscious of anything special going on, except that the application will perform better than its competitors thanks to those 32-bit registers and its improved use of memory.

What about programming tools? If you choose Unix as your environment, you'll find that it is typically supplied with a vintage C and FORTRAN compiler, linker, and object-module librarian; a mediocre BASIC interpreter; and a primitive assembler that supports neither macros nor almost any other kind of helpful assembler directive. Third-party alternatives to the default Unix tools are expensive by DOS

standards. If that weren't reason enough, you'll also find that there is little or no compatibility in disk media or binary load modules between Unix systems. (These latter problems are supposed to be fixed "real soon.")

By contrast, if you decide in favor of a DOS extender development environment, you have a wide selection of tools at hand. Phar Lap's products have set the standard for DOS-based 80386 assemblers and linkers; they have no real competition at present. Companies already shipping 32-bit high-level language compilers for the

**Deciding in favor of  
a DOS extender  
development  
environment gives  
you a wide selection  
of tools.**

80386 include MetaWare (C and Pascal), Science Applications International Corp. (SVS FORTRAN, C, and Pascal), MicroWay (NDP FORTRAN, C, and Pascal), and Language Processors (LPI FORTRAN, COBOL, and Pascal).

You should note, however, that some of the compilers do not work with all three DOS extenders. Before you make a commitment to any particular compiler and/or DOS extender, be sure that you have carefully researched the question of compatibility. And you should also take some time to discuss the requirements for runtime royalties with the respective vendors. An excellent comparative review of 80386 programming tools can be found in the March/April 1988 issue of *Programmer's Journal*.

I'll have more to say about 80386 tools and I'll present representative code in upcoming issues.

### THE IN-BOX

Please send your questions, suggestions, and comments to me at any of the following e-mail addresses:  
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**If you choose a DOS  
extender instead of  
switching operating  
systems, you won't  
have to reformat  
your hard disk since  
extenders use DOS's  
file system services.**

ucts of all these companies include a debugger and various utilities, and all allow you—by purchasing a separate distribution license—to embed the DOS extender into an application program for resale. Of course, to create such a program, you'll also need to buy an 80386-specific compiler or assembler and linker; I'll talk about these in a moment.

IGC's DOS extender is called *X-AM*, and it appears to be an incidental offshoot of IGC's *VM/386* operating-system project. Its documentation and its debugger have been criticized (elsewhere) as being the weakest among the three available DOS extenders. In any event, at this point



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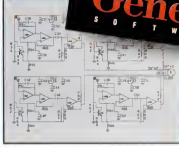
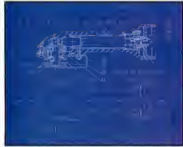
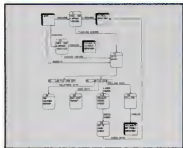
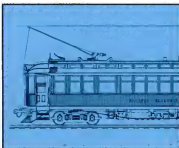
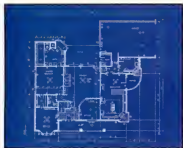
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Neil J. Rubenking

# User-to-User

## DISPLAY ALL COLOR COMBINATIONS

Many people buy a color monitor but never learn how to set the foreground and background colors using DOS. Although most current software automatically takes advantage of color, the DOS color attributes return to their original state when you exit the application. I've seen several batch files for setting display colors, but I haven't seen one that gives examples of different color combinations. I've created a batch file that fills this void (see Figure 1).

SCREEN.BAT uses ANSI commands to change the cursor position, color attributes, and prompt message. For this batch file to work, ANSISYS must be loaded by placing the command

```
DEVICE=ANSI.SYS
```

in your CONFIG.SYS file. Because your system looks at the CONFIG.SYS file before it ever reads your PATH command, the path to ANSISYS also must be included if this file is not located in your root directory. Once this is done, reboot to actually install ANSISYS.

Depending on the number and size of other environment variables, such as your path statement, you could run out of environment space before SCREEN.BAT finishes execution. If this happens, you should expand your environment by putting the following command in your CONFIG.SYS file:

```
SETL=C:\COMMAND.COM /E:65536/P
```

This will work with DOS 3.1 and later. It expands the environment to <size>\*16 bytes, where <size> can be any number from 11 to 62. The limit is increased to 32,767 bytes in Versions 3.2 and later. (In DOS 3.2 and later, the <size> parameter is the actual number of bytes, from 160 to 32,767, rather than the number of 16-byte "paragraphs."—Ed.)

If you activate SCREEN.BAT without any parameters, a help screen will show you 128 different color combinations and

■ **DISPLAY ALL COLOR COMBINATIONS:** See all the ANSI color combinations possible and choose the one you like the best.

■ **BATCH FILES SPEED FILE TRANSFER:** A more efficient way to copy files to floppy disks.

■ **DELETING DATA:** A better way to delete sensitive data from large and small files.

will explain the proper syntax for the command. The syntax is

```
SCREEN f b
```

where *f* is the foreground color (0 to 7) and *b* is the background color (0 to 7). If you want a bright foreground color, add the third parameter *B* (for example, SCREEN 7 5 B).

L. R. LeBlanc  
New Orleans, Louisiana

**PC** This is a great idea, but LeBlanc's batch file only handles 24 color combinations and takes almost 300 batch lines. I've streamlined the file, as shown in Figure 1.

When you type in SCREEN.BAT, it's extremely important to realize that "[ symbolizes the escape character; it is not a caret (^) followed by a left bracket ([). Not every editor is capable of inserting the escape character. In EDLIN, you can create it by pressing ^V (hold down the Ctrl key and press V) followed by the [ character. In SideKick or any of Borland's program editors, you must hold down Ctrl and press P, then [. If you make an error, SCREEN.BAT will just create a jumble on your screen. Note also that in every case the es-

cape character is followed by an actual left-bracket character.

Some text editors can't create the escape character, but they can copy it. If your editor is one of these, just make a file using EDLIN that contains nothing but a single escape character. Now load that file into your editor and copy the escape character wherever necessary.

SCREEN.BAT manipulates your prompt to change the standard color. If it just added to the existing prompt, however, your prompt would grow each time you ran SCREEN.BAT. To avoid this problem, the batch file copies your prompt to the environment variable PROM the first time you run it. Then when you make a color change, it sets your prompt to the value of PROM followed by the color command.

Once you determine the colors you want, you can add a line to the end of your AUTOEXEC to set them. For example, for bright yellow text on a blue background, use

```
SCREEN 3 4 B
```

SCREEN.BAT will add the appropriate color command to whatever prompt you have already set.

ANSI commands are what make SCREEN.BAT's formatted display of colors possible. To see how the display works, let's dissect this line:

```
... BCHO "[19c;26H"[8;34c;  
41mXX"[18c"[15mXX
```

Note the two occurrences of %c%; each constitutes a FOR command parameter that will be replaced in turn by each number from 0 to 7. If the current value were 4, the command being executed would be

```
BCHO "[14;26H"[8;34;  
41mXX"[18c"[15mXX
```

where "[14;26H tells ANSI to position the cursor at row 14, column 26;

### User-to-User

## SCREEN.BAT

```

CROM OFF
IF "I$FROM1"="" SET FROM=I$FROMPT1
CLS
IF NOT "I1"="" GOTO GotParams
ECHO Each row is numbered with a foreground color.
ECHO Each column is numbered with a background color.
ECHO To select a color, simply enter "SCREEN f h",
ECHO where f is the foreground color and h the background.
ECHO Add a B for Bright, e.g. "SCREEN 3 1 B".
ECHO Press a key when you're done looking at the chart.
REM Five spaces between 7 and 8 in next line.
ECHO "[9:26NF 1 2 3 4 5 6 7          # 2 3 4 5 6 7
REM 14 spaces between Normal and Bright in next line.
ECHO "[14:26NFNormal          Bright
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:24Xttc
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:26X"[#34tc:46XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:28H"[#34tc:42XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:32E"[#34tc:44XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:32V"[#34tc:44XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:34H"[#34tc:44XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:36X"[#34tc:45XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:38E"[#34tc:46XX"[18C"[14XX
FOR ttc tX (# 1 2 3 4 5 6 7) DO ECHO "[14c:38V"[#34tc:46XX"[18C"[14XX
PAUSE > NUL
ECHO "[1:37:4fm
GOTO end
:GotParams
IF "I2"="" GOTO BadParams
IF NOT "I3"="" IF NOT "I3"=""="B" IF NOT "I3"=""="B" GOTO BadParams
SET fore=X
FOR ttc tX (# 1 2 3 4 5 6 7) DO IF t1=ttc SET fore=t1
IF tfore=X GOTO BadParams
SET back=X
FOR ttc tX (# 1 2 3 4 5 6 7) DO IF t2=ttc SET back=t2
IF tback=X GOTO BadParams
SET bright=B
IF NOT "I3"="" SET bright=1
PROMPT "FROM1:[t1bright;t4back;t3foram
ECHO ON
CLS
CROM OFF
SET fore=
SET back=
SET bright=
GOTO end
:BadParams
ECHO To display all color combinations, enter "SCREEN" with no parameters.
ECHO To set foreground color f and background color b, enter
ECHO "SCREEN f b
ECHO where f and h are both from # to 7. To make the foreground
ECHO color BRIGHT, add a B. For example, to set bright yellow text
ECHO on a red background,
ECHO SCREEN 1 1 B

```

## COMPLETE LISTING



mirror image. It copies files from drive A: to the current subdirectory.

QUIT.BAT (Figure 4) is used to speed processing. While scarcely necessary here, this technique helps considerably with longer files, as DOS's line-at-a-time processing is rather slow. If QUIT.BAT is on your path, calling QUIT ends processing immediately.

Al Lowe  
Fresno, California



**PC** With TOA and FROMA you can set up your own "sneakernet" network. When you need files transferred, use TOA to put them on a floppy disk and FROMA to put them on the target hard disk. QUIT.BAT works, too, and I have a QUIT.BAT file myself. However, I use a zero-length file. A file of even 1 byte occupies a whole cluster (generally from 1K to 4K, depending on how the disk was partitioned), but a zero-length file takes

## TOA.BAT

## COMPLETE LISTING

```
REM -----
REM      TOA.BAT      ;
REM
REM Copy several files to drive A:
ECHO OFF
IF NOT "%1" == "" GOTO NextFile
COPY *.* A:
SHIFT
:NextFile
IF "%1" == "" quit
COPY %1 A:
SHIFT
GOTO NextFile
REM      End of TOA.BAT
```



**Figure 2:** TOA.BAT lets you quickly copy to drive A: as many files as you can fit on the command line.

**Figure 1: SCREEN.BAT uses ANSI to set your DOS colors or to display all of the choices.**

[[0;34;41m instructs ANSI to set the color to nonbright (0) blue foreground (34) and red background (41); XX tells the program to print a pair of Xs; [[18C tells ANSI to move the cursor ahead 18 columns; [[1m tells ANSI to make the current color bright; and XX is another pair of Xs. A series of statements like these builds the color chart.

## BATCH FILES SPEED FILE TRANSFER

Here are three simple batch files that I find quite useful when transferring files to and from my hard disk.

TOABAT, shown in Figure 2, allows you to copy as many files as you can possi-

bly fit on a command line without constantly having to repeat the pesky "COPY" and "A:" for each. For example, the following copies the five (or more) files named to drive A:

```
TOA local.fil \batch\this.bat *.com
17.exe \wpl\other.dat
```

If called with no filenames, it defaults to "."  
(in the present subdirectory, of course).

copies all files in the current subdirectory to drive A:

## FROM A BAT

## COMPLETE LISTING

```
REM -----
REM 1: FROMA.BAT 1
REM -----
REM Copy several files from drive A:
BCDIO OFF
IF NOT %1 == "" GOTO NextFile
COPY %1.*
SHIFT
%NextFile
IF %1 == "" quit
COPY %1.*
SHIFT
GOTO NextFile
REM End of FROMA.BAT
```



**Figure 3:** Use FROMA.BAT to transfer multiple files from drive A: to the current subdirectory more easily.

## User-to-User

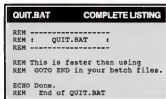


Figure 4: Call QUIT.BAT to halt a long batch file at any point.

nothing but a directory entry. To create it, type the following:

```
TYPE QUIT.BAT > QUIT.BAT
```

Now you can halt a long batch file from the middle by calling QUIT rather than with a slow GOTO End.

### DELETING DATA

I've revised the WIPE.BAT from your November 15, 1988, issue. The new file, shown in Figure 5, is a better way of destroying the contents of a file. The syntax is

```
WIPE filespec [filespec] [filespec]
... [filespec]
```

where filespec is a DOS file specification.

This batch file uses SHIFT to eliminate any restrictions on the number of parameters specified by the user. The only limit is the length of the command line imposed by COMMAND.COM. It also requires that the DOS DEBUG program be available on the user's path.

As you can see from the figure, I don't like to type REM. By using a leading colon (:), the line is treated as a label and not processed. Although the comment lines slow it down, they help when I modify the file.

Jim Cook  
El Cerrito, California



It's true that the original WIPE.BAT wouldn't stop a determined hacker. In the April 25, 1989, issue, I provided a method using DEBUG that will absolutely overwrite every byte of sensitive data. However, it requires some facility with DEBUG and is far from automatic. The method presented here is a happy medium—it completely destroys all the data in files less than 64K in size and at the least wipes out the first 64K of larger files.

Do note that you will need at least 64K of free disk space to use this technique—that's the space taken by WIPE.SS1. If the files you're wiping out are small, you'll need still more free disk space, since each

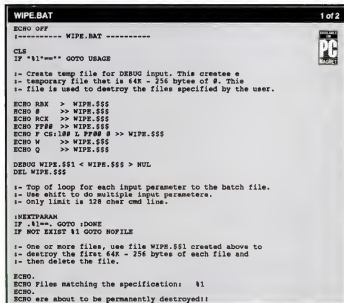


Figure 5: This new version of WIPE.BAT is a more effective way to delete sensitive data from any file.

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## User-to-User

file grows to 64K when you copy WIPE.\$\$1 onto it. Note also that you need not fill the file with zeros. Replace the 0 just before the redirection sign in the line

```
ECHO F CS:100 L 7788 0 >> WIPE.$$1
```

with any combination of byte values and quoted strings. For example,

```
ECHO F CS:100 L 7788 7 'ACCESS  
DENIED' 1A >> WIPE.$$1
```

If someone tries to unerase the wiped file and TYPE it, the 7 will cause a beep, ACCESS DENIED will show, and the 1A end-of-file character will end the display.

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#### WIPE.BAT

2 of 2

```
ECHO To abort without deleting any files, press [CTRL-BREAK] or  
PAUSE  
FOR %F IN (%1) DO COPY WIPE.$$1 %F > NUL  
IF EXIST %1 DEL %1  
ECHO.  
ECHO %1 file(s) destroyed end deleted  
SHIFT  
GOTO NEXTPARAM  
  
:- No files matching spec, tell user and continue  
  
:NOFILE  
ECHO.  
ECHO No files of type: %1  
ECHO.  
SHIFT  
GOTO NEXTPARAM  
  
:- Define syntax to the user  
  
:USAGE  
ECHO WIPE - Permanently destroy and delete a file or group of files.  
ECHO.  
ECHO Usage:  
ECHO.  
ECHO WIPE filespec1 [filespec2] ... [filespecN]  
ECHO.  
ECHO where: filespec1, filespec2, ... filespecN may be any legal DOS file  
ECHO specification. Each filespec may contain wildcard characters.  
ECHO.  
  
:- All done, exit the batch file  
  
:DONE  
if exist WIPE.$$1 del WIPE.$$1
```

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edited by  
Craig L. Stark

# Power User

**dBASE III PLUS FILE PROCESSING**  
SET ODOMETER TO *n* (where *n* is a number) is a completely undocumented command that will save you considerable time when working with *dBASE III Plus* files. Consider the following example:

```
USE yourdbf
SET ODOM TO 100
COPY TO temp
```

When a COPY command is executed, a record counter is incremented as each record is copied, and unless you have SET TALK OFF, this number is displayed on the screen. If the above SET ODOM TO 100 is issued first, the number will be displayed only for each 100th record copied. And the less the screen is updated, the faster the copying process will be completed. Also, it makes for a cleaner display.

Vern Suter  
Burnsville, Minnesota

**PC** Processes like COPY and COUNT execute more quickly when TALK is SET OFF. Any screen write takes time, and *dBASE*'s screen writing is slow compared with other software.

However, with TALK OFF you can't see what progress is being made. My experience watching users is that their frustration and impatience during any long processing delay is greatly reduced or even eliminated if they are kept informed (by the record counter, in this case) of ongoing progress.

Mr. Suter's discovery provides the perfect solution for *dBASE III Plus* users (sorry, it doesn't work with earlier versions), and I am amazed that this feature has been left undocumented. Figure 1 shows the performance gains you can expect when you increase the odometer setting from 1 to 10. Above 10, the improvement in performance tapers off rapidly. —Brad Stark

## REMOVING HYPHENS

After I have used the automatic hyphenation in *WordPerfect*, I sometimes decide

■ **dBASE III PLUS FILE PROCESSING:** Speed up file processing using an undocumented *dBASE III Plus* command.

■ **REMOVING HYPHENS:** Use this macro to delete hyphens from a *WordPerfect* document.

■ **DELETING GLOSSARY ENTRIES:** Automatically delete glossary entries in *Microsoft Word 4.0*, using point-and-shoot macros.

that my document would look better without the hyphens. Unfortunately, simply turning off the hyphenation does not remove the hyphens that *WordPerfect* placed in the document. Because *WordPerfect* inserts a "soft hyphen," it is possible to globally search for them and replace them with nothing. To do this, I created the DEHYPHEN macro shown in Figure 2.

First the macro deletes any hyphenation-on codes in the document, and then it deletes the soft hyphens. If you don't remove these codes, the hyphens will pop up again when the macro is over. Note that

```
<f10><f10><f10><f10><f10>
```

is necessary to pick up a hyphenation-on code located before the text of the document begins.

Richard G. Burt  
San Jose, California

**PC** *WordPerfect* has three hyphen characters, and also has a fourth character that cancels hyphenation for a given word. When you press the hyphen key, you get a hyphen character that is always visible on the screen. *WordPerfect* will break a word at the hyphen char-

acter, if one is present.

The hyphens inserted by *WordPerfect* are soft hyphens—you can enter your own by pressing Ctrl-hyphen to tell *WordPerfect* where to break a particular word if hyphenation is necessary. These are invisible unless used to hyphenate the word they're in. You can see a soft hyphen that is not being used only if you are in the Reveal Codes mode, Alt-F3.

You should use a hard hyphen when you *don't* want *WordPerfect* to break a word at the hyphen, for example, in a mathematical formula. Pressing Home and then hyphen will enter a hard hyphen into your document.

Finally, if *WordPerfect* prompts you for hyphenation help and you press F1 and cancel, a cancel hyphenation code will appear in front of the word. *WordPerfect* won't try to hyphenate that word again. If you know that certain words should not be hyphenated, you can preface them with the



Figure 1: The figures above show the performance gains available by using *dBASE III Plus*'s undocumented SET ODOMETER TO *n* command. Timings shown are for copying 10,000 records of a short, three-field database.



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## Power User

### DEHYPHEN MACRO

```
<Ctrl-F10>
DEHYPHEN
<Home><Home><Home><Up>
<Home><Alt-F2>N
<Shift-F8>LYO
<F2><F2>
<Home><Home><Home><Up>
<Home><Alt-F2>N
<Ctrl-Rhyphen>
<F2><F2>
<Ctrl-F10>
```

Begin macro definition  
Call it DEHYPHEN  
Go to very beginning of document  
Extended search/replace,  
no confirm  
Search for hyphen-on code  
Replace with nothing  
Back to very beginning  
Extended search/replace,  
no confirm  
Search for soft hyphen  
Replace with nothing  
End macro definition

Figure 2: This macro allows you to automatically remove the soft hyphens from your WordPerfect document. It searches globally for them and replaces them with nothing.

### HYPHENATING WORDPERFECT DOCUMENTS

	Hyphen	Hard Hyphen	Soft Hyphen	Cancel Hyphen
Key to create	Hyphen	Home-Hyphen	Ctrl-Hyphen	Ctrl-Slash
Shows on-screen	Always	Always	Sometimes	Never
Used for hyphenation	Yes	No	Yes	N/A
Appearance in Reveal Codes	[—]	—	—	[/]

N/A — Not applicable: this character indicates that a word should not be hyphenated

Figure 3: The above table shows the four hyphenation-related characters that WordPerfect 5.0 uses and how they appear on your screen in the Reveal Codes mode.

cancel hyphenation code, Ctrl-/ . Again, this code is visible only in Reveal Codes mode, where it appears as a highlighted slash in brackets ([/]).

Figure 3 describes the differences between the hyphenation characters that are used by WordPerfect 5.0. It also shows how they look in the Reveal Codes mode. You can see that there is a clear difference between the three kinds of hyphens.—Neil J. Rubenking

### DELETING GLOSSARY ENTRIES

Microsoft Word 4.0 only lets you merge old glossaries rather than create and load new ones. This can sometimes cause problems. Those of us who work with more than one glossary will occasionally make the mistake of merging a glossary without first deleting all of the entries in the current glossary. If you make this error without realizing it, and then save the glossary to disk, the resulting glossary file will be filled with unwanted entries.

Figures 4 and 5 show two macros that will help you clean out the overloaded gloss-

sary. The first, PRNGLOSS, uses Tom Kihken's PRN2FILE utility (December 22, 1987) to print the glossary to a file called GLOSS.DOC, and then load the file into Microsoft Word.

PRNGLOSS invokes PRN2FILE through the Library Run command, stores your current printer setting, changes the printer setting to t.t.y and prints the glossary. It then changes the printer choice back to the original setting, uses the Library Run command to disable redirection, and loads GLOSS1.DOC so you can browse through the list of glossary entries to pick those you want to delete.

Note that Word by itself will let you print the glossary listing to your printer, but not to a file. Also, you'll have to change the path in line 4 to match the location of your .PRD files. You may also have to assign an appropriate path for PRN2FILE.

The second macro, DELGLOSS, automatically deletes entries from the glossary and marks them as deleted in GLOSS.DOC. To use this macro, invoke it, highlight the name of the entry you want to de-

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386MB DRIVE	\$1,889	\$2,889	\$1,889	\$2,889	\$4,109	\$3,109	\$4,309	\$3,309
10MB DRIVE	\$1,389	\$2,389	\$1,389	\$2,389	\$4,409	\$3,409	\$4,609	\$3,609
142MB DRIVE	\$4,389	\$5,389	\$4,389	\$5,389	\$4,709	\$3,709	\$4,909	\$3,909

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10MB DRIVE	\$2,109	\$1,809	\$2,109	\$1,849	\$2,609	\$2,309	\$2,809	\$2,509
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BASIC SYSTEM	\$ 918	\$ 768	\$ 978	\$ 828	\$1,388	\$1,238	\$1,688	\$1,438
386MB DRIVE	\$1,178	\$1,028	\$1,238	\$1,088	\$1,648	\$1,498	\$1,848	\$1,698
40MB DRIVE	\$1,368	\$1,218	\$1,428	\$1,278	\$1,838	\$1,688	\$2,038	\$1,888
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## Power User

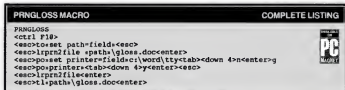


Figure 4: PRNGLOSS lets you print a Microsoft Word 4.0 glossary to disk.

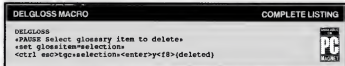


Figure 5: DELGLOSS, which deletes glossary entries, works together with PRNGLOSS.



Figure 6: This batch file warns you if you risk accidentally destroying a glossary.

lete, and hit Enter. Everything else is automatic. You still have to pick which entries to delete, but the chore is now as painless as it can be.

Xavier Le Hericy  
Portland, Oregon

**PC** The two macros described above provide an elegant tool as an approach to maintaining a glossary, and they should be of interest to any Word user who spends a lot of time with macros. However, the real solution to the problem of accidentally destroying a glossary is to have a backup of that file available as well as an easy procedure that will check and warn you when you may have a problem. This is best handled automatically through a batch file.

For example, if you keep your glossary files in C:\WORD, you can create a backup directory C:\WORD\BU, and use the batch file, CHKGLOSS.BAT, which is shown in Figure 6. If you always run Word through this batch file, the file will automatically show you a directory of your current and backup glossaries every time you leave Word. It will then stop and ask you to compare file sizes. If you have accidental-

ly merged two glossaries, the size of the current glossary should be much bigger than the backup version. If so, you can spot it immediately and copy the backup version back to your Word directory.

Note the /m switch in the XCOPY line. This tells XCOPY to copy only those files that have been modified since the last time they were copied. If you have many glossary files, it will speed backing up considerably. If you're still using DOS 3.1 or earlier, simply use the COPY command instead. (There is no /m or equivalent switch with the COPY command.)—M. David Stone

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# Languages



## TURBO PASCAL TIPS

■ Never use the Copy command to extract a single character from a string. Like the other string-manipulation commands, Copy uses a lot of stack space. Instead, just index into the string as if it were an array of characters. For example, given a string S and a CHAR variable MyChar:

```
MyChar := S[Copy(S,1,1)];
```

■ Due to an error in Version 4.0 of Turbo Pascal, you could use certain functions on the left side of an assignment statement. Common examples are:

```
Length(StringVar) := #;
```

and

```
Chr(ByteVar) := 'A';
```

Pascal does not normally allow functions on the left side of an assignment. Consequently, Turbo Pascal 4.0 programs that take advantage of this bug will not work with Turbo Pascal, Version 5.0.

■ When you install Turbo Pascal 5.0, it copies some files and creates others. Among those it creates is TPC.CFG, the configuration file for the command-line compiler. Unfortunately, it omits the final carriage return from this file, which confuses TPC.EXE. If you are having inexplicable trouble with TPC, check your TPC.CFG file—it will most likely be missing the needed carriage return. Add the carriage return and the problem will go away.—Neil J. Rubenking

## CONSTRUCTING SOUNDEX CODES

The Soundex method of compressing names was developed by Margaret Odell and Robert Russel and covered by U.S. patents 1261167 (1918) and 1435663 (1922). The system has come into common use by many states, as well as by the Federal government, to encode names where

■ **TURBO PASCAL TIPS:** Improve your Turbo Pascal programming using these tips and techniques.

■ **CONSTRUCTING SOUNDEX CODES:** Create Soundex-based codes with this Pascal function.

■ **DETERMINING HARDWARE CONFIGURATION:** A simple method to determine what adapters are installed in a host PC.

■ **HELP FOR ONE-FLOPPY SYSTEMS:** Save your programs from nasty DOS messages when they run on one-floppy systems.

the ability to search based on the sound of a name is desired. Examples of current use are the U.S. Census Bureau index of census enumeration records, and Maryland Motor Vehicle Administration use for drivers license number prefixes and managing computer files of licensed drivers.

Figure 1 gives examples of names that have been encoded and shows two benefits: first, similar names usually become grouped together by the coding; second, the shortening of names into four characters (or bytes) provides a fixed-length representation of a name. By adding the two initials (first and middle name), the fixed length code is more likely to be unique.

In constructing the code, the first letter of a name is not translated but is accepted as is. The next three digits of the code are formed by table look-up in conformity with Soundex rules. The letters a, e, i, o, u, y, w, and h are not coded. In the listing for

SOUNDEX.PAS (Figure 2), those letters are replaced by a period in the table. The other letters of the alphabet are replaced by a number in the range 1 to 6 (see Figure 3). A name such as Roe yields a code containing the letter R and three zeros, following the rule that all codes must have three numbers and will be right-zero-filled to achieve this where necessary. Notice also that a name such as Dickey or Smith has zeros added only to the extent necessary.

During construction of the Soundex code, when two letters with the same numeric key appear next to each other, the second one is dropped (notice the c and G in McGee, the c and k in Dickey, or the c



## EXAMPLES OF NAMES COMPRESSED USING SOUNDEX CODES

Name	Code
Wellborn	W416
Wellborn	W416
Wellbourne	W416
Wilburn	W416
Wellesbourne	W421
Smith	S530
Smythe	S530
Smitty	S530
Smith	S530
Roe	R000
Rowe	R000
Van der Meer	V536
Meer, Van der	M615
McGee	M200
McCann	M250
McConnell	M254
Dickey	D200
Riddelmose	R345
Pegoschowsky	L222
Oppenheimer	O155
Zepnian	Z155

Figure 1: The Soundex method of encoding names is used where the ability to search based on the sound of a name is desired.

## Languages

and C and doubled *n* in McConnell and McCann). However, a name such as Pegoschowsky has several letters with a replacement value of 2, but many are separated by noncoded letters. The result allows for doubling of numerals.

Such name prefixes such as "Von," "van," "de," or "D" are often reversed

with the rest of the name, giving a more appropriately coded Soundex, especially when you're using the result as a search key for a database—either manual or automated. The impact of reversal can be seen in the coding of Van der Meer.

The Soundex FUNCTION will correctly compile using either Version 3.01 or 4.0 of Turbo Pascal. To compile under 3.01, comment out the "USES Crt" line at the top.

Bruce F. Wellborn  
Rockville, Maryland

**SOUNDEX.PAS**
**COMPLETE LISTING**

```

PROGRAM TestSoundex;

USES Crt; (*comment out for TP3*)
TYPE
  SString = STRING[255];
VAR
  IPString : SString;
  Row : Byte;

FUNCTION Soundex(TextString : SString) : SString;
CONST SoundexTable : ARRAY[1..26] OF Char =
  '123.12..22455.12623.1.2.2';
(* ABCDEFGHIJKLMNOPQRSTUVWXYZ *)
VAR
  SoundString : SString;
  FirstChar : Char;
  I1, I2 : Integer;
BEGIN
  (* Provide for trailing zero fill *)
  FillChar(SoundString[1], 255, '0');
  SoundString[0] := #255;
  (* First character is always alpha *)
  FirstChar := Upcase(TextString[1]);
  (* First atep - ASCII to soundex *)
  FOR I1 := 1 TO Length(TextString)-1 DO
    BEGIN
      I2 := Ord(Upcase(TextString[I1+1]))-64;
      (* Range check for good letters *)
      IF (I2 < 1) OR (I2 > 26) THEN I2 := 1;
      SoundString[I1] := SoundexTable[I2];
    END;
    I1 := 1; (* Initialize for second pass *)
    (* Eliminate non-soundex characters and side by side duplicates *)
    REPEAT
      WHILE SoundString[I1] = '.' DO Delete(SoundString, I1, 1);
      IF SoundString[I1] = SoundString[I1+1] THEN
        Delete(SoundString, I1, 1);
      I1 := I1 + 1;
    UNTIL SoundString[I1] = '0';
    Soundex := FirstChar+Copy(SoundString, 1, 3);
  END; (* End of Soundex FUNCTION *)

BEGIN
  Row := 24;
  REPEAT
    IF Row = 24 THEN
      BEGIN
        Row := 1;
        ClrScr;
        END;
    GoToXY(10, 24);
    Write('Enter a name to be encoded: ');
    ReadLn(IPString);
    IF IPString <> '' THEN
      BEGIN
        GoToXY(10, 24);
        ClrEol;
        GoToXY(10, Row);
        Write(IPString);
        GoToXY(32, Row);
        WriteLn('-> ', Soundex(IPString));
        Row := Row+1;
      END;
    UNTIL IPString = '';
  END.
  
```

Figure 2: The Soundex function maps names that sound alike to the same Soundex code.

PC BUILDING SOUNDEX CODES	
Code	Key equivalents
1	b, f, p, v
2	c, g, j, k, q, s, x, z
3	d, t
4	l
5	m, n
6	r

Figure 3: The letters a, e, i, o, u, y, w, and h are not coded. The other letters are replaced by a number in the range 1 to 6.

Mr. Wellborn states that when two letters of the same type are adjacent, the second gets dropped. If there are more in a row, however, only the second of each pair gets dropped. Hence the code for Mace and Massey is M200, for Macks or Maszcka, M220, and for Majzcsky, M222. I don't have the official specifications for the Soundex code, but it seems possible that this is an error. Since

**Soundex has come into use where the ability to search based on sound is desired.**

two adjacent letters of the same type are to be coded as one, perhaps three or more in a row should also be coded as one. If this is the case, a simple change in the final REPEAT..UNTIL loop will correct the algorithm. It's almost enough to change the IF..THEN test to a WHILE..DO. However, you also need to stop when you hit a zero character. Hence the modified statement would read

```

WHILE (SoundString[I1] =
  SoundString[I1+1]) AND
  (SoundString[I1] <> '0') DO
  Delete(SoundString, I1, 1);
  
```

With this modification, all of the above names from Mace to Majzcsky will have the same Soundex code, M200.—Neil J. Rubenking.



## Languages

### DETERMINING HARDWARE CONFIGURATION

Using Turbo Basic on an XT clone, I needed a way to determine what adapter cards and other options are available. For example, it is useful to know if a serial port is installed before attempting to open it for input or output. The program **HARDWARE.BAS** that is shown in Figure 4 provides a report of a system's hardware configuration. It uses the BIOS interrupts &H11 and &H12, which provide a handy way for you to obtain this information.

P. Brahmanantham  
Reseda, California

**PC** All of the information returned by interrupts &H11 and &H12 may also be found by PEEKing in low memory addresses &H410 and &H413. One excellent source for information about DOS and BIOS services is Peter Norton's *New Programmer's Guide to the IBM PC and PS/2* (Microsoft Press, ISBN 1-55615-131-4). Notice the clever way that VAL is used in conjunction with Turbo Basic's &B binary prefix. These BIOS services return their information bit-coded, and this technique greatly simplifies the steps needed to isolate the value of a group of bits in the middle of a byte. (Are

These BIOS services  
return their information  
bit-coded, and this  
technique greatly  
simplifies the steps  
needed to isolate the  
value of a group of bits  
in the middle of a byte.

you listening, Microsoft?) Also notice that while the type of monitor is reported, the newer EGA and VGA adapters are not distinguished.—*Ethan Winer*

**PC** **PRODUCTIVITY TIP**  
In Turbo Pascal 5.0, programs that use the IEEE floating-point types (single, double, extended, and comp) can run on machines without an 80x87 if you use the {SN+,E+} compiler directives. When an 80x87 is present, the program will take advantage of it; otherwise the program will emulate it.

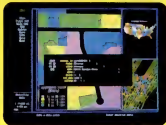
HARDWARE.BAS	COMPLETE LISTING
<pre> ***** HARDWARE.BAS - determines installed hardware using Turbo Basic CLS CALL INTERRUPT &amp;H11 Equip\$ = RTN\$(REG(1)) Length = LEN(Equip\$) Equip\$ = STRING\$(16 - Length, 48) + Equip\$ PCRAM = VAL("&amp;B" + MID\$(Equip\$, 13, 2)) + 1 * 16 VMode = VAL("&amp;B" + MID\$(Equip\$, 11, 2)) DiskDrives = VAL("&amp;B" + MID\$(Equip\$, 9, 2)) + 1 RS232 = VAL("&amp;B" + MID\$(Equip\$, 8, 3)) Game = VAL("&amp;B" + MID\$(Equip\$, 6, 1)) Parallel = VAL("&amp;B" + MID\$(Equip\$, 1, 2))  CALL INTERRUPT &amp;H12 SysMem = REG(1)  IF VMode = 1 THEN Monitor\$ = " 40 X 25 Color Graphics Adapter" IF VMode = 2 THEN Monitor\$ = " 80 X 25 Color Graphics Adapter" IF VMode = 3 THEN Monitor\$ = " Monochrome Display Adapter"  PRINT "Disk Drives"      ; DiskDrives PRINT "Serial Port"      ; RS232 PRINT "Game Ports"       ; Game PRINT "Parallel Ports"   ; Parallel PRINT "System Memory"    ; SysMem; "K" PRINT "Video Adapter"     ; Monitor\$ </pre>	

Figure 4: Use CALL INTERRUPT to query the BIOS to determine available hardware devices.

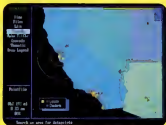
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## Languages

### HELP FOR ONE-FLOPPY SYSTEMS

A user-friendly program must anticipate any problems that it could encounter. One such problem occurs when B: is used as part of a filename that the program tries to open on a system with only one floppy disk drive. DOS will then prompt the user with

the familiar message

Insert diskette for drive B: and  
strike any key when ready

DOS then assigns the drive as B: and continues without any problems. Unfortunately, when this message appears in the middle of a screen full of information, it overwrites the contents of the screen.

I have written several Turbo Pascal rou-

#### ONEDRIVE.PAS

#### COMPLETE LISTING

```
PROGRAM FloppyDemo;
USES Crt;
VAR fileptr : Text;

FUNCTION NumberOfDisketteDrives : Byte;
{ Returns the number of DISKETTE drives available }
VAR
  equip : Integer ABSOLUTE $0000 : $0410;
BEGIN
  IF (equip AND $0001) = 1 THEN
    NumberOfDisketteDrives := ((equip SHR 6) AND $0003)+1
  ELSE
    NumberOfDisketteDrives := 0;
END;

FUNCTION FirstDiskDrive : Char;
{ Returns the letter of first diskette drive (A or B) }
BEGIN
  IF NumberOfDisketteDrives > 1 THEN FirstDiskDrive := 'A'
  ELSE
    CASE Mem[$0000 : $0504] OF
      00 : FirstDiskDrive := 'A';
      01 : FirstDiskDrive := 'B';
    END;
END;

PROCEDURE MakeFirstDrive(drive : Char);
{ Makes the first diskette drive A or B }
BEGIN
  IF NumberOfDisketteDrives = 1 THEN
    CASE Upcase(drive) OF
      'A' : Mem[$0000 : $0504] := 00;
      'B' : Mem[$0000 : $0504] := 01;
    END;
END;

BEGIN
  ClrScr;
  IF NumberOfDisketteDrives > 1 THEN
    WriteLn('You have more than one floppy drive...terminating')
  ELSE
    BEGIN
      WriteLn('Put a scratch disk into drive A.');      WriteLn('Reassigning drive A to B.');
      IF FirstDiskDrive = 'A' THEN MakeFirstDrive('B');

      Write('Press a key to write "B:JUNK.DAT"...');
      IF ReadKey = 00 THEN (Dummy ReadKey call)
        WriteLn;

      Assign(fileptr, 'B:JUNK.DAT');
      Rewrite(fileptr);
      WriteLn(fileptr, 'Test File');
      Close(fileptr);

      WriteLn('Done...returning drive to A.');      MakeFirstDrive('A');
    END;
  END;
END;
```

Figure 5: Use A: and B: on one-drive systems so that the DOS message doesn't wreck your screens.

## Languages

times to deal with this problem. One solution is to check the number of floppy drives available and not allow the user to enter B: when only one drive is installed. ONE-DRIVE.PAS (shown in Figure 5), however, takes a different approach; it makes its own drive reassignment, thereby bypassing the DOS message.

Henry Chow  
Vienna, Virginia



I've seen other solutions that involved trying to trap the DOS operation that generates the warning message—this one is much more straightforward. If you use this technique in a program, you may want to make one change. At present, it always resets the single disk

Reassigning a drive is the best solution when characters within a filename could be misconstrued as a drive designation.

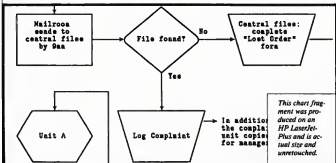
drive to be the A: drive. It would be better to call FirstDiskDrive at the start, save the value, and restore it at the end. Note that this program works just as well under Turbo Pascal, Version 3, if you omit the "USES Crt" clause at the start and change the ReadKey call to a "Read(Kbd, dummy);", where dummy is a CHAR variable. —Neil J. Rubenking.

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edited by  
Tony Rizzo

# Tutor

## DETECTING VIDEO ADAPTER TYPES

Occasionally a program needs to be able to detect what type of display it's running on. What is the best way to figure out what kind of video adapter is installed in a system? I have heard a rumor that Microsoft once used the IBM signature in EGA ROM to identify an EGA. Is this still a valid method? If so, what should a program look for to identify a VGA?

Ned Phillips  
Gainesville, Florida



It is true that *Microsoft Windows* once identified an EGA by the IBM signature in ROM, but that was back in the early days of the EGA, when IBM was the sole manufacturer of EGA boards. It also happens to be true that most third-party EGA makers followed IBM's lead and included the letters "IBM" in the same ROM location, for compatibility reasons. But this is a poor argument for using such an unreliable method to detect the presence of an EGA. In addition, you would still have to find another means of detecting a VGA, since there most certainly isn't a ROM signature of any type in the same location on every VGA board on the market.

The best way for your program to determine what video adapter is in a given system is to begin by having the program make the assumption that the highest-level adapter exists in the system. You then work your way down a decision tree until you reach an assumption that cannot be disproved. To check for any VGA, EGA, CGA, or MDA, your program simply needs to follow this three-step sequence:

- Check for the presence of a VGA by calling interrupt 10h with AH set to 1Ah and AL set to 0. If, on return, AL is set to 1Ah, then the system is equipped with a VGA. If it is not, proceed to the following step.
- Check for the presence of an EGA by executing an interrupt 10h with AH set to 12h and BL set to 10h. If BL is still equal

■ **DETECTING VIDEO ADAPTER TYPES:** Give your programs the ability to reliably detect the type of video adapter installed in a system.

■ **KEEPING TRACK OF DIRECTORIES:** Use PUSHDIR and POPDIR to manage subdirectories from within batch files or the command line.

to 10h on return, then assume there is no EGA and proceed to the next step. Otherwise, an EGA is installed.

- Assume that either a CGA or an MDA is installed and determine which of the two it is by inspecting the word value at address 0040:0063, which holds the base address of the CRT controller. If this value is 3Bxh, then the adapter is monochrome (an MDA). If it is 3Dxh, then a CGA is installed.

One configuration detail every program should watch for is the possibility that an EGA is installed but isn't the currently active display device. An EGA connected to a color monitor can share the same bus with an MDA, and an EGA driving a monochrome monitor will coreside with a CGA. The user can switch back and forth between monitors with the DOS MODE command. To tell whether the EGA is the active display adapter once its presence is confirmed, check bit 3 of the EGA information byte in the BIOS data area at 0040:0087. If bit 3 is set, the EGA is not active; if bit 3 is clear, then the EGA is the active adapter. When the EGA isn't active, a program can tell whether the active adapter is a CGA or an MDA by checking the base address of the CRT controller as described above in the third step.

Another important point to remember is that both the EGA and the VGA can oper-

ate in monochrome or color. If your program accesses the video buffer directly, you'll need to know what mode the display adapter is running in to determine where the video buffer lies. Again, the easiest way to tell is by checking the CRT controller address in the BIOS data area.—Jeff Prossie

## KEEPING TRACK OF DIRECTORIES

Is there a way to save the current directory so that when you execute a batch file that must change directories you can easily return to the current directory?

Donald N. Retzsch  
Cincinnati, Ohio



There have been so many letters asking this same question that we can only conclude many of our readers missed the *PC Magazine* PUSHDIR/POPDIR utility offered in the May 27, 1986, issue. It is often the case that a batch file will need to change the directory, as Mr. Retzsch indicates in his question. It is also common to be working within a subdirectory that has a long pathname when you need to go to some other subdirectory, and finally return to the original starting point. Usually this entails having to retype entire pathnames.

PUSHDIR and POPDIR, both available from PC MagNet, turn these situations into simple, painless tasks. Locate them in a subdirectory listed in your path statement so that they will always be available. PUSHDIR places as many as six directory entries into a save area it creates. POPDIR recalls subdirectories from this save area in reverse order—the last directory is recalled first, the second-to-last second, and so on.

To use the pair from the command line, simply type PUSHDIR, then change to a different subdirectory. When you are ready to return to the original subdirectory, type POPDIR and you will find yourself back at the original subdirectory. To use them from a batch file, run PUSHDIR be-

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## Tutor

fore you change to a different subdirectory, then POPDIR before exiting. Typically, a batch file is most useful when it is as general as possible. You can easily change subdirectories by hard-coding

**You can easily change subdirectories by hard-coding them into your batch file, but often you want to be able to make use of a batch file from any number of places.**

them into your batch file, but often you want to be able to make use of a batch file from any number of places.

Suppose, for example, that you would like to dial up PC MagNet, get some information, then return to whatever directory you were working in. The following batch file:

```
pushdir
cd \xtalk
xtalk pcmanet
popdir
```

does the trick, returning you to the subdirectory that you originally started from.

—Tony Rizzo

### ASK THE TUTOR

The Tutor solves practical problems, explains points of general interest about using your hardware and software more productively, and answers basic questions about DOS and systems in general. To see your questions answered here, drop a line to Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016, or upload them to PC MagNet (see the "By Modem" sidebar in the Utilities column). We're sorry, but we cannot answer questions personally.

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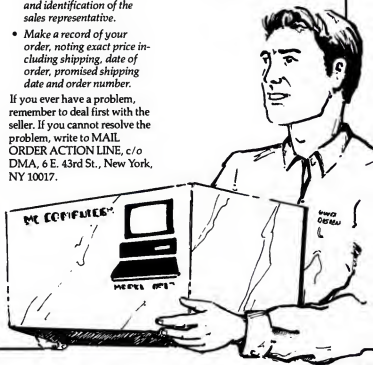
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**PANASONIC KXF 120:** 929

**SIEMENS RF 150/9600:** 609/799

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Lepreards feature components offering the latest technology. You can use them as the first or second hard disk in your system. Low power draws mean less strain on your system. You get a 1 year warranty, unlimited technical support, & our illustrated installation and user's guide. Models available for IBM PC/XT and compatibles, ATs and compatibles, ATs and compatibles, as well as the TANDY 1000/AS/CT/XT/LSL.

**FREE SOFTWARE** including TAKE TWO, the backup utility PC MAGAZINE named "Editors Choice" in 1986 & 1987. Also included are Menu Direct and LEPREARD software from Multisoft.

COMPUTER TYPE	21MB	32MB	40MB	65MB
8 BIT PC-XT	\$299	<b>\$309</b>	\$479	\$509
16 BIT PC-XT	N/A	\$379	\$549	\$579

HIGH PERFORMANCE SCSI DRIVERS	40MB	65MB	40MB	65MB
SCSI DRIVERS	\$249	\$279	<b>\$399</b>	\$609



Tandy 1000 models add \$20



MENUS DIRECT

## Calculator Keyboard

**\$89**

- 111 Key enhanced layout
- Built-in Solar Powered Calculator
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Our data crunching systems come standard with high performance SCSI controllers. That gives you the data transfer capabilities required by the high performance generation of systems. All our computers have 8 expansion slot motherboards, room for 1 full and 3 half-height drives, semi-rigid disks, RAM 512K, 1024K, 2048K choice of 1.2 MB or 1.44 MB floppy drive, and Lapware Enhanced Keyboard with tactile switches and built-in auto-erasing calculator.

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COMPARE OUR DOWN TO EARTH PRICES AND EXCEPTIONAL PERFORMANCE

SYSTEM	286	386	PRICE
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286-16	16.0	3.3	<b>\$899</b>
386-16	16.7	2.8	<b>\$1,799</b>
386-20	24.4	4.3	<b>\$1,999</b>
386-25	30.5	5.8	<b>\$2,799</b>

## Seagate SCSI Kits

The Small Computer Systems Interface (SCSI) provides increased performance, reliability and flexibility over ST-412. Performance is improved through improved transfer rates, built-in 1.1 error rates, and auto error detection and correction.

Shamrock SCSI kits are compatible with all 286, 286, 386, PS/2 Model 24, 30 and 30/86 systems.

Each kit includes high speed SCSI hard drive with face plate, host adapter, installation guide with menu-driven software, and mounting hardware. Bundled software includes the TakeTwo backup utility, and Lapreard disk cache software. Specify computer when ordering.

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87157N	3.5"	40MB	40 msec	<b>\$389</b>
87277N	5.25"	64MB	40 msec	<b>\$499</b>
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Seagate

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Tandy 1000 kits add \$20

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Standard Features	286-Based Computers				386-Based Computers			
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On Board Memory	1MB	1MB	1MB	540K	1MB	2MB	1MB	1MB
Possible On Board Upgrade	4MB	NONE	13MB	4MB	8MB	4MB	16MB	16MB
Floppy	1.2MB (\$14)	1.44MB (\$14)	1.44MB (\$14)	1.2MB (\$14)	1.2MB (\$14)	1.44MB (\$14)	1.44MB (\$14)	1.2MB (\$14)
Standard Hard Disk	40MB (28ms)	20MB (80ms)	20MB (80ms)	20MB (80ms)	40MB (28ms)	40MB (28ms)	40MB (28ms)	40MB (28ms)
Available Hard Disk Upgrades†	80MB (\$395)	NONE	40MB (\$139)	40MB (\$100)	320MB (\$1995)	320MB (\$649)	320MB (\$499)	320MB (\$499)
Operating System Software	DOS 4.01 (\$45)	DOS 4.01 (\$120)	DOS 4.01 (\$120)	DOS 4.01 (\$119)	DOS 4.01 (\$45)	DOS 4.01 (\$120)	DOS 4.01 (\$120)	DOS 4.01 (\$119)
Price	\$1595	\$3595‡	\$2795‡	\$1695	\$1995	\$895	\$695	\$399
Optional EGA Card/ Monitor	\$395	—	—	—	\$395	—	—	—
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† Up to 300MB

‡ Without Monitor

§ Available in Tower Case or Desktop

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- 12mhz 80286
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- Monochrome Graphics Card
- 101 Key Enhanced Keyboard with tactile click
- Parallel & Serial Ports
- Clock Calendar
- 1.2mb Floppy Disk Drive
- 5 Drive Bays
- 8 Expansion Slots
- Security Lock
- Utility Software
- 80287 Coprocessor Option
- 200 Watt Power Supply
- Call for other Options

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EGA Color	Add:\$350
16 Bit VGA Color	Add:\$450

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- Phoenix BIOS
- Monochrome Graphics Card
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- Parallel & Serial Ports
- Clock Calendar
- 1.2mb Floppy Disk Drive
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# Chosen #1 In Value By Corporate Buyers

**B**est Buys. With twice the speed of an IBM XT, the CompuAdd Turbo/10 is a popular choice for home users and small businesses. Its 8088 microprocessor, running at 10MHz, is fully IBM-compatible. And with eight expansion slots you can easily add enhancements such as FAX boards, memory cards and mouse devices. The Turbo/10 comes equipped with a 5.25" 360KB diskette drive, keyboard, and a wide choice of options.



*"Its fast performance, low price and superior keyboard make it a solid value"* PC World (8/88)

## CompuAdd Turbo/10

- 8088 processor running at switchable 10MHz or 4.77MHz speeds
- 640KB RAM
- 5.25" 360KB half-height, dual-sided diskette drive
- Dual diskette drive controller board
- Eight XT-compatible expansion slots
- 8087 math coprocessor support
- Front panel display with keylock, reset button, turbo button, plus LED indicators
- Choice of enhanced 101-key, AT-style, or 5151 keyboard

**\$545**

Turbo/10 System	MGA	EGA	VGA
No Hard Drive	\$679	\$1,029	\$1,149
30MB	\$949	\$1,299	\$1,419

**B**usiness Workhorses. The CompuAdd 286/12 is chosen first by value-minded buyers for its solid performance and low price. In a comparison of five "Hot" 80286 bargains by PC/Computing (2/89), CompuAdd's speed came out on top. Little wonder. With the CPU running at 12MHz and 0 wait state architecture, the 286/12 is 50% faster than the IBM AT, with a 13.7 rating on Norton's SI 4.0 test.



*"The system combines high speed and a low price for a very good value"* Info World (1/25/88)

## CompuAdd 286/12

- 80286 processor running at 12MHz or 6MHz switchable system speeds
- 0 wait state
- 512KB RAM expandable to 1MB
- Choice of 5.25" 1.2MB or 3.5" 1.44MB diskette drive
- Dual diskette/hard drive controller
- Six 16-bit and two 8-bit expansion slots
- 80287 math coprocessor support
- Choice of enhanced 101-key, AT-style, or 5151 keyboard
- 13.7 on Norton's SI 4.0 test

**\$945**

286/12 System	MGA	EGA	VGA
30MB	\$1,299	\$1,649	\$1,769
40MB	\$1,499	\$1,849	\$1,969

## 90-Day Express Product Exchange

If a problem effects the service or operation of a component purchased as a CompuAdd system (CPU, monitor, or keyboard) in the first 90 days, we will determine the cause and, if needed, ship a replacement part or product within 48 hours (depending on availability of part) via Federal Express<sup>®</sup> standard air—at our expense.

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When PC Week asked corporate buyers how satisfied they were with their 286/12MHz computers, CompuAdd was number one in value for the price.

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#### CompuAdd 286/20

- 80286 processor running at 20MHz or 8MHz switchable system speeds
- 0 wait state (four-way interleaved)
- 1MB RAM expandable to 5MB
- Choice of 5.25" 1.2MB or 3.5" 1.44MB diskette drive
- Dual diskette/hard drive controller
- Eight expansion slots
- Two serial ports and a parallel port built-in
- 80287 math coprocessor support
- Enhanced 101-key keyboard
- 20.4 on Norton's SI 4.0 test (22.5 rating with 2MB memory and four-way interleave)

**\$1595**

286/20 System	MGA	EGA	VGA
40MB	\$2,155	\$2,505	\$2,825
80MB	\$2,345	\$2,695	\$2,815

#### CompuAdd 386/16

- 80386 processor running at 16MHz or 8MHz
- 0 wait state (page-mode memory)
- 32-bit high speed RAM board
- 1MB RAM expandable to 10MB
- System/option ROM shadowing
- Choice of 5.25" 1.2MB or 3.5" 1.44MB diskette drive
- Dual diskette/hard drive controller
- Seven expansion slots
- 80287 math coprocessor support
- Choice of enhanced 101-key, AT-style, or 5151 keyboard
- 17.6 on Norton's SI 4.0 test

**\$1795**

386/16 System	MGA	EGA	VGA
40MB	\$2,365	\$2,705	\$2,825
80MB	\$2,545	\$2,895	\$3,015

**O**n-Site Service. You'll get On-Site warranty protection free for a full year when you purchase any CompuAdd 286/20 or 386 computer. Once your service contract is in effect, just call our toll-free customer support line at the first sign of a problem. If we can't solve it on the phone, a field technician will be at your office the next business day.

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Personal Computing (2/89)

#### Free INTEGRATOR™ Software

All 286 and 386 systems come with the user-friendly INTEGRATOR software package, featuring program/file managers, cardfile database, calendar, calculator, text editor, and PC-FullBak™.



#### CompuAdd 386/20

- 80386 processor running at 20MHz or 8MHz
- 0 wait state (32KB cache memory)
- 32-bit high speed RAM board with 1MB RAM expands to 16MB
- System/option ROM shadowing
- Choice of 5.25" 1.2MB or 3.5" 1.44MB diskette drive
- Dual diskette/hard drive controller
- Seven expansion slots
- Two serial ports and a parallel port built-in
- 80387/Weitek math coprocessor support
- Enhanced 101-key keyboard
- 23.0 on Norton's SI 4.0 test

**\$2195**

386/20 System	MGA	EGA	VGA
40MB	\$2,755	\$3,105	\$3,225
80MB	\$2,945	\$3,295	\$3,415

#### CompuAdd 386/25

- 80386 processor running at 25MHz or 8MHz
- 0 wait state (32KB cache memory)
- 32-bit high speed RAM board with 1MB RAM expands to 16MB
- System/option ROM shadowing
- Choice of 5.25" 1.2MB or 3.5" 1.44MB diskette drive
- Dual diskette/hard drive controller
- Seven expansion slots
- Two serial ports and a parallel port built-in
- 80387/Weitek math coprocessor support
- Enhanced 101-key keyboard
- 28.8 on Norton's SI 4.0 test

**\$2895**

386/25 System	MGA	EGA	VGA
40MB	\$3,455	\$3,805	\$3,925
80MB	\$3,645	\$3,995	\$4,115

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PC Magazine  
(5/30/89)



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A workhorse system based on the trusty Turbo/10, a PC World "Best Buy." Perfect for students or home users.

#### Kit includes:

CompuAdd Turbo/10 computer running at 10MHz and 4.77MHz; 640KB RAM; 5.25" 360KB diskette drive; diskette drive controller; eight expansion slots; math coprocessor support; and choice of AT-style, 5151, or enhanced 101-key keyboard.

Monochrome monographics monitor or upgrade to EGA or VGA color video.

Star Micronics NX-1000™ printer with multiple type styles, 144cps draft and 36cps near letter quality.

Hard Drive upgrade increases your system capacity with an optional 30MB hard drive. See the chart below.

Accessories and software including paper, printer cable, ten diskettes and Spinaker® Eight-in-One™ integrated software. Plus CompuAdd MS-DOS™ (v4.01) and GW-BASIC. PC-FullBak™ software with optional hard drive.

**\$879**

Hard Drives	Monographics	EGA	VGA
No Hard Drive	\$879	\$1,229	\$1,349
30MB	\$1,129	\$1,479	\$1,599

### Professional Starter Kit™

Our best selling kit. The CompuAdd 286/12 is a popular entry-level computer for the business environment due to its low price and 286 performance. InfoWorld said of the 286/12, "The system combines high speed and a low price for a very good value."

#### Kit includes:

CompuAdd 286/12 computer running at 12MHz and 8MHz; 512KB RAM expandable to 1MB; 5.25" 1.2MB diskette drive; 30MB hard drive (or upgrade, see chart); eight expansion slots; math coprocessor support; and choice of AT-style, 5151, or enhanced 101-key keyboard.

Monochrome monographics monitor or upgrade to EGA or VGA color video.

Panasonic® 1180 printer with tractor/friction paper feed, printing 182cps draft and 38cps near letter quality.

Accessories and software including paper, printer cable, ten diskettes and CompuAdd INTEGRATOR™ with program/file manager, cardfile database, calendar, calculator, text editor, and PC-FullBak software, plus CompuAdd MS-DOS (v4.01) and GW-BASIC.

**\$1495**

Hard Drives	Monographics	EGA	VGA
30MB	\$1,495	\$1,845	\$1,965
40MB	\$1,595	\$1,945	\$2,065

# The

## Monitors

### Monographics

Flat screen monitor with 12" screen and tilt/swivel... **\$95**

### CGA

IBM-compatible color monitor with 14" diagonal screen... **\$239**

### EGA

IBM-compatible 14" EGA monitor... **\$349**



### VGA

Amdek 432W VGA monochrome monitor with flat screen and tilt/swivel... **\$220**  
Color VGA 14" analog monitor... **\$379**  
Zenith 14" Color VGA monitor 640x480... **\$649**

## Combos

### Monographics Combo

Monographics 12" flat screen monitor with tilt/swivel, plus monographics card... **\$139**

### CGA Combo

CGA 14" IBM-compatible monitor with up to 640x240 resolution, plus CGA graphics card... **\$279**

### EGA Combo

EGA 14" IBM-compatible monitor with 640x350 resolution, plus EGA graphics card... **\$489**

### VGA Combo

VGA 14" analog monitor with 16 out of 256K colors, plus VGA graphics card... **\$579**

### Super VGA Combo

Mitsubishi Diamond Scan monitor with resolution up to 800x800 and dot pitch of 0.31 plus a CompuAdd 16-Bit VGA card... **\$745**

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Call 800-999-9901 any weekday from 8 a.m. to 7 p.m. CST, and our technical support representatives will be happy to talk you through any hardware or software difficulty. If we cannot resolve a hardware problem over the phone, you may ship your system to our Austin service center and we will fix it free and pay the return freight.

# Value/Price Leader

## Hard Drives

PC Magazine chose CompuAdd as Editor's Choice for mail-order hard disks (June 27, 1989).



ATs and Compatibles	
Seagate	
20MB (65ms)	\$219
40MB (28ms)	\$399
76MB (28ms) full-height	\$629
MiniScribe	
40MB (61ms)	\$319

**FREE!** with every hard drive purchased.

PC-FullBak™ backup software a \$59.95 value

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XTs and Compatibles	
Seagate	
20MB (65ms)	\$279
MiniScribe	
20MB (65ms)	\$279
30MB (65ms) RLL	\$299
40MB (61ms)	\$379

### FlashCards for XT's

Fast, high capacity MiniScribe hard drive mounted on a bracket with controller for trouble-free installation.

FlashCard 20™ (20MB, 65ms)	\$299
FlashCard 30™ (30MB, 65ms)	\$329
FlashCard 40™ (40MB, 45ms)	\$399

## Diskette Drives



360KB 5.25" diskette drive for the XT (black)	\$89
360KB 5.25" diskette drive for the AT (gray)	\$99
360KB 5.25" Teac drive for the XT (black)	\$109
360KB 5.25" Teac drive for the XT (gray)	\$109
720KB 3.5" diskette drive for the XT (black)	\$89
720KB 3.5" diskette drive for the AT (gray)	\$89
1.2MB 5.25" diskette drive for the AT (gray)	\$95
1.2MB 5.25" Teac drive for the AT (gray)	\$119
1.44MB 3.5" diskette drive (gray)	\$109

## Printers

Epson LX-810 80 columns, 200cps draft, 30cps NLQ	\$199
Epson FX-1050 132 columns, 264cps draft, 54cps NLQ	\$449
Epson LQ-510 80 columns, 225cps draft, 75cps LQ	\$349
Epson LQ-950 104 columns, 330cps draft, 111cps LQ	\$579
Epson LQ-1050 132 columns, 264cps draft, 88cps LQ	\$739
Panasonic 1180 80 columns, 192cps draft, 36cps NLQ	\$195
Panasonic 1191 80 columns, 240cps draft, 48cps NLQ	\$259
Panasonic 1524 132 columns, 240cps draft, 80cps NLQ	\$559
Panasonic 1595 132 columns, 288cps draft, 61cps NLQ	\$465
OkiData 321 132 columns, 300cps draft, 63cps NLQ	\$465
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8087-2 8MHz coprocessor	\$149
8087-10 10MHz coprocessor	\$199
80287-8 8MHz coprocessor	\$219
80287-10 10MHz coprocessor	\$259
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# Affordable Accessories

## Pointing Devices

Logitech™ Serial for AT and PS/2 Mouse programmable with three buttons... **\$89**



CompuAdd Serial Mouse features Dr. HALO™ III, pad, and pocket... **\$55**

Microsoft™ Bus Mouse mechanical mouse with bus interface... **\$119**

Genius Digitizer Tablet provides resolutions up to 1000 lines per inch on a 12" x 12" work area. Includes Dr. HALO III software... **\$309**

Mech III Joystick... **\$35**

CompuAdd Joystick... **\$19.95**

## Scanner

Scan Man™ from Logitech captures photographs, drawings, and printed materials for quick input into your computer. Features a large four-inch scanning window. Edit the scanned image with the Scanware™ Graphics Editor included, or place it directly into your Microsoft Windows™ clipboard... **\$199**

## Keyboard Drawers

Keyboard drawer for storage under CPU or monitor... **\$35.95**  
Undercarriage drawer attaches under desktop or shelf... **\$24.95**

## Tandy Products

**FlashCards**  
FlashCard-20™—20MB drive and controller card mounted on brackets. For 1000A/SX/TX... **\$319**

FlashCard-30™—30MB drive and controller card mounted on brackets. For 1000A/SX/TX... **\$359**

**Diskette Drives**  
360KB drive for Tandy 1000A/SX/TX... **\$99**  
360KB drive for Tandy 3000HL... **\$99**  
720KB for 1000A/SX/TX... **\$109**

**Hard Drives**  
20MB half-height drive for 1000A (65ms)... **\$299**  
20MB half-height drive for SX/TX (65ms)... **\$299**  
20MB half-height drive for 3000HL (65ms)... **\$369**  
40MB half-height drive for 1000A (61ms)... **\$395**  
40MB half-height drive for SX/TX (40ms)... **\$439**  
44MB half-height drive for 3000HL (25ms)... **\$639**

## Cards

**I/O Cards**  
AT I/O serial port, parallel port, and game port... **\$49**  
XT I/O serial port, parallel port, game port, and clock/calendar... **\$55**

**Video Cards**  
Monochromics card up to 720x348 resolution... **\$49**  
Hercules™ Monochrome Graphics Card Plus up to 720x348 resolution... **\$179**  
Hercules Color Graphics card for AT on a half-size card... **\$149**  
CompuAdd EGA-480 IBM/EGA-compatible card with 256KB display memory... **\$179**  
CompuAdd 16-Bit VGA card 800x600 resolution, 16/256K colors, supports IBM VGA, CGA, and Hercules Monochrome graphics... **\$260**  
Video-7™ Vega VGA card 640x480 and 800x600 resolutions with 16/256K color capability... **\$279**

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ChargeCard 286™ makes your XT run 66 times faster... **\$249**  
Orchid TinyTurbo™ Board for the speed of an AT on your 8088... **\$279**

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**Memory Cards**  
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EMS XT with 0KB... **\$99**  
EMS AT with 0KB... **\$119**  
Intel Above™ Board Plus with 512KB... **\$419**

## Uninterruptible Power Supplies

End data corruption due to power disruptions such as blackouts, surges, spikes, noise, and sags.

NEW! TSI 3150 for PC/XT/AT and PS/2s... **\$329**  
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Portable JT. FAX board (4800 bps) with carrying case... **\$390**

## Cables

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6' cable (DB25M to C36M)... **\$9.95**  
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10' cable (DB25M to DB25M)... **\$12.95**

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MultiMate Advantage II™... **\$274**  
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Model 70—60 Mb Disk	\$3650
Model 75—60/120 Mb Disk	\$5100/\$4900
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Desktop 386/33 320 Mb	\$10599
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Superport Mod 20	\$2265
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SEAGATE 30 Mb KH	\$295
SEAGATE 40 Mb KH XT	\$366
SEAGATE 40 Mb XT 251-F	\$399
SEAGATE 60 Mb	\$599
TOSHIBA 1.44 Mb Floppy	\$110
PROCOM Ext 5 25" for PS/2	\$290
COMPAQ 1.44 1/3 HT	\$195

### Card Drives

PLUS 20 Mb/40 Mb Hard Card	\$535/\$647
PROCOM 20 Mb	\$379
PROCOM 30 Mb/40 Mb	\$420/\$518
PROCOM 45 Mb for PS/2	\$795
MAYNARD 20 Mb	\$241

### FAX

MURATA M1200	\$341
MURATA M1800	\$699
SHARP FO2200/F0300	\$695/\$1150
SHARP FO300	\$1420
TOSHIBA 3010	\$1275
TOSHIBA T30100	\$1048
TOSHIBA T3300	\$1199
TOSHIBA T3700	\$1560

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MAYNARD 80 Mb XT/AT Int/Ext	\$675/\$811
MAYNARD 60 Mb for PS/2	\$699
MOUNTAIN 60 Mb	\$1199

### MONOCHROME MONITORS

AMDEK 410A	\$145
COMPAQ Mono Amber/Green	\$210
COMPAQ VGA Mono	\$210
IBM PS/2 8503	\$200
MULTISYNC GS	\$240
PACKARD BELL Amber/Green	\$85

### COLOR/EGA MONITORS

AMDEK C600/C722	\$344/\$35
IBM PS/2 8512	\$435
PS/2 UltraSync	\$550
SAMSUNG RGB	\$245
ZENITH 1290	\$405

### VGA/CAD MONITORS

COMPAQ AGCM Monitor	\$1390
COMPAQ VGA Color	\$520
IBM PS/2 8513	\$515
IBM PS/2 8514	\$1150
MITSUBISHI 8505	\$2718
NEC MultiSync XL	\$2050
NEC MultiSync 40/50	\$1130/\$400
NEC MultiSync 24/30	\$519/\$79
PACKARD BELL	\$349
ZENITH 1490	\$619

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HYUNDAI Desktop Workstation	\$631
WESTERN DIGITAL 3 Node LAN kit w/WVD Network Driver	\$850
Entry-Level 286 Starter Kit, 4 Users	\$575
NOVELL LLS II	\$1875
NOVELL 286 Software V.2.15	\$2100
NOVELL SPT Level II V.2.15	\$3200
ARNET PS/10	\$2100
ARNET PC120	\$185
ARNET PC860	\$235
NE 1000 Ethernet Card	\$325
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ARNET Passive Hub	\$90
ARNET Active Hub	\$469
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IBM 3198	\$1050
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### WYSE 50 Amber or Green

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Aldus Pagemaker	\$450
COMPAQ DOS 3.31/4.0	\$69/110
Glaze IV	\$255
DisplayWrite IV/2	\$450
IBM OS/2 1.34 01	\$90/110
IBM OS/2 Extended 1.1	\$255
IBM OS/2 Extended 1.1	\$450
Lotus 1-2-3 V 2.01/3.0	\$310/\$330
Lotus Symphony	\$420
Microsoft Windows 286/386	\$79/\$135
Microsoft Excel	\$290
Microsoft Word/Work	\$220/110
Northgate Advantage 2	\$99/91
Northgate Advantage 4.5	\$65
Paradox 3.0	\$218
PS/1 Quick	\$75
QuickBase	\$34
Smartcom I/II	\$90/150
Ventura Publishing	\$45
Word Perfect 5.0	\$225

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HP DeskJet 1100	\$675
HP ScanJet 1100 with toner	\$1675/\$950
HP ScanJet Plus with HP	\$1529
NEC LC890	\$1350
PANASONIC KX40450	\$1375
TOSHIBA PageLaser 12-8	\$2499

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HP Plotter 7550	\$2500
Sumascan 12x10/12x18	\$375/\$530

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FX 850 260/84 cps	\$345
FX 1050 260/84 cps	\$379
LQ 850 80/180 cps	\$510
LQ 850 264/78 cps	\$510
LQ 1050 264/78 cps	\$510
LQ 1250 40/103 cps	\$730
LP 810 30/180 cps	\$929
DPX 5000 533/80 cps	\$1399

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Quickwriter	\$1079
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Proprietary XL 24e	\$810
Proprietary XL XL	\$645

### NEC

P2200 170/55 24 Wire	\$339
P5200	\$507
P5300	\$705
P5400 400/140 cps	\$1025

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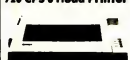
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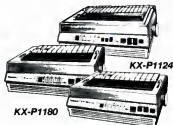
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80387-18	\$350	80387-18SX	\$310
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BASE SYSTEM Features	PC XT	86-10	86-12	286-12	286-16	386-20	386-24
CPU	8086-2	8088-1	V20	80286	80286	80386	80386
Speed (Mhz)	8/4	7/7	10/4	12/5	16/6	20/8	24/8
BIOS	ERSO	ERSO	ERGO	ERGO	AMI	AMI	AMI
Wait States	1	0/1	0/1	0/1	0/1	0/1	1
Standard Memory Config.	640K	640K	640K	1MB	1MB	1MB	1MB
On Board Memory Expansion				4MB	5MB	8MB	8MB
Shadow RAM BIOS					384K	384K	384K
Coprocessor Support	8087	8087	8087	80287	80287	80387	80387
Expansion Slots	8-8 bit	8-8 bit	8-8 bit	2-6-16	2-6-16	2-6-16	2-6-16
Dual Hard Floppy Controller	w/H.D.	w/H.D.	w/H.D.	Yes	Yes	Yes	Yes
Device Bay(s) (E-external/H-L)	4-E	2-E-2-I	2-E-2-I	3-E-2-I	3-E-2-I	3-E-2-I	3-E-2-I
Serial Ports	1	1	1	optional	optional	optional	optional
Parallel Ports	2	2	2	1	1	1	1
Game Ports	2	2	2	1	1	1	1
Bus Mouse Port	1	1	1	1	1	1	1
Power Supply Size	150W	150W	150W	200W	200W	200W	200W
Key Tronics USA Keyboard	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EZ DOS 4.0 w/EMM TOPDOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Battery Backup Clock	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Norton SI Rating 4 Division	1.8	2.1	4.9	14	18.3	22.5	25
Landmark Systems	3-1	4-1	5	10-8	21	24	26

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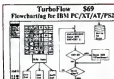
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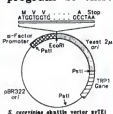
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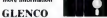
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1. In which of the following sectors does your organization operate? (Check one.)

- a. ☐ Private Industry  
b. ☐ Government  
c. ☐ Education

2. Your primary job function is (check one):

- d. ☐ MIS/DE Communications  
e. ☐ Systems, Programming  
f. ☐ Engineering/R&D  
g. ☐ Finance/Accounting  
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i. ☐ Administrative/General Management

3. Is your company a reseller?

- i. ☐ Yes j. ☐ No

4. For how many IBM PCs and compatibles do you specify brands of products?

- k. ☐ 10 or less  
l. ☐ 11-25  
m. ☐ 26-100  
n. ☐ 100 or more

5. Are there any PCs in your office? (Check all that apply.)

- a. ☐ Limited to mainframe  
p. ☐ Linked to mini  
q. ☐ Networked together

6. Does your company own a:

- r. ☐ Mainframe(s) s. ☐ Mini(s)

7. Do you plan to buy any PC products?

- t. ☐ Now  
u. ☐ In 4 to 6 months  
v. ☐ In 6 to 12 months  
w. ☐ No definite plans

8. Number of employees in your entire company?

- x. ☐ 25 or less y. ☐ 500-999  
z. ☐ 100-499

9. Are there any Macintosh computers in your office?

3. ☐ Yes 4. ☐ No

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## COMING UP

### ■ CLOSING IN ON THE MAC

Selling to increasingly sophisticated business audiences requires ever-more-meticulous presentations: sharper graphical images, more-attractive statistical representations, and better control of the show as a whole. And don't underestimate the importance of flexibility of output. Contributing editor Robin Raskin and *PC Magazine's* graphics experts take a long look at seven idea-to-applause presentation graphics packages. Our Suitability to Task ratings will give you real-world help in deciding which one is right for you.

### ■ CLIP ART: THE EQUALIZER

Not all business people can double as professional graphic artists. Fortunately, electronic clip art offers clean, tasteful icons and decorations to spruce up your image. We look at 17 clip art libraries that can work in conjunction with your graphics package to take the sting out of creating beautiful slides, screens, and handouts.

### ■ CONNECTIVITY

Training costs are too often overlooked when companies purchase new software. Wouldn't it be nice if the office expert could be looking over everyone's shoulder, guiding and prodding until each person begins to catch on? PC LAN Labs evaluates seven products that have been designed to allow users to have remote control of networked PCs.

### ■ LOW-END LAPTOPS

"Lightweight" both literally and figuratively, these battery-powered 8088- and 8086-based laptops are also reasonably priced. Our comparative reviews of 15 models search for the adequate bargains in the face of obsolescence; price comparisons between these machines and 286- and 386-based portables will help you decide where to find the most power for your money. ■



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## After Hours

### Products for the Leisure Side of Personal Computing

## LSAT Prep Software from Mindscape Gives Advice, Examples, and Little Else

### EDUCATION

by Edward Mendelson

When you take a standardized test, you have to leave three things at the door: your calculator, your vocabulary cards, and your common sense. Virtually every test that measures your qualifications for graduate or professional school includes questions on logic that aren't very logical and analytic questions that won't stand up to analysis. So if you want to perform well on the test, you need to figure out which multiple-choice answer the testers want to hear, and you should forget about the answer that makes the most sense.

### TEST-TAKING STRATEGY

Mindscape's \$79.95 software training course for the Law School Admission Test, *Mastering the LSAT*, offers a practice test and basic advice on test-taking strategies, but it doesn't go far enough. The course helps you figure out what the examiners think is relevant in questions about evidence and law, but the course gets tangled in its own illogic when it advises you how to answer questions that make you analyze an argument.

One of the sample Argument Analysis questions in the course has five possible answers—four of them wrong. The program counts one of those wrong answers as correct, but it doesn't tell you how to make yourself believe it in order to get a higher grade on the LSAT. It tells you how to construct diagrams for solving problems in Conceptual Structures, but some of the diagrams are more confusing than patterns you would ordinarily

work out in your head.

For its \$79.95 price tag *Mastering the LSAT* doesn't give you much that you couldn't get out of a much cheaper book. When you try to answer the

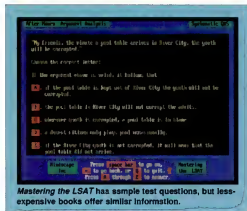
text of many questions on one screen, you either have to jump back and forth between screens (using the Left Arrow key to go back and the Spacebar to go forward) or consult the workbook. Consulting the workbook is a test in itself. The screen doesn't tell you the page number (only the section and question number), and you have to flip back and forth to the table of contents because the workbook

## ■ GAMES

**Life & Death:  
You're the doctor**

**TKO: Come out punching!**

**Space Quest III:**  
Sierra On-Line's  
newest looks and  
sounds great.



has no running heads.

Sometimes the screen doesn't even tell you the relevant question number but simply directs you with vague cross-references, such as instructing you to read "the automobile passage" or "the election passage." Finding those passages sometimes seems more difficult than getting into Harvard Law.

**List Price:** *Mastering the LSAT*, \$79.95. **Requires:** 256K RAM, DOS 2.1 or later. Minidiscap Inc., 3444 Dundee Rd., Northbrook, IL 60062; (312) 480-7667.

CIRCLE 421 ON READER SERVICE CARD

training questions, the course gives you two wrong guesses before telling you the right answer. That second chance is the one real advantage you get from practicing on-screen instead of on paper.

You also get a lot of text screens with information that you can't highlight or underline unless you want to write all over your monitor, and you take a timed practice test that isn't realistic because you won't take the real LSAT on-screen. The accompanying workbook does contain an additional practice test that you take on paper, but it's cheaper to buy that kind of test in a book.

Because your monitor isn't big enough to display the full

## Neurobics Works Your Mind like Jane Fonda Works Your Body

### EDUCATION

by Jonathan Matzkin

Bodybuilders have a favorite cliché: no pain, no gain. That's why they spend untold hours doing painful—and painfully boring—repetitions of the same exercises. Building your mind can be a similar process. You learn math by doing problems over and over until the concepts sink in. You learn vocabulary by using words in hypothetical sentences until they become second nature.

It's a mistake to carry the analogy between bodybuilding and mental development too far, but *Neurobics*, from Ocean Isle Software, certainly is a workout for your noggin. The program includes a series of deceptively simple "puzzles" that test and develop your ability to observe, reason, and remember. And as workouts go, this one is pretty enjoyable.

"Rain" stretches your pattern-matching prowess. You begin by watching droplets of water

CONTINUES

## After Hours

### Neurobics

CONTINUED

fall into a series of numbered pots. When the droplets stop falling, you try to duplicate the pattern by tapping your keyboard's number keys in the same sequence. The program keeps track of your mistakes, and it tallies your score after you have accounted for all of the drops.

A tap of the F3 key brings up a host of options for those who either have genius IQs or enjoy punishment. You can vary the number of drops in the sequence between 3 and 99, and you can repeat the pattern in either forward or reverse order. To make the exercise particularly challenging, you can cause multiple drops to fall simultaneously.

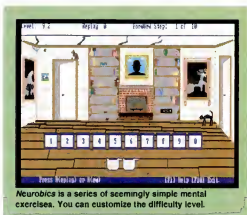
Five other puzzles await, ready to challenge you, frustrate you, and hopefully strengthen your mind. All of them can be customized for different difficulty levels or play preferences.

"Milk" is the old problem of three bottles of differing volume capacities. The object is to end up with a specific amount of liquid in one of the bottles by successively pouring from one to another. *Neurobics* tracks not only the number of pours but also the elapsed time between the first pour and your solution.

"Money Trail" tests your deductive reasoning as you try to figure out where a pattern begins and ends. "Deja Vu" duplicates the popular game "Concentration." "TAK" is a PC version of the puzzle that consists of numbered tiles, which you must put in order, arranged in a square frame.

*Neurobics* has a rudimentary graphing facility, which tracks your progress as you gain facility. The puzzles themselves are displayed along with CGA graphics that don't really do much other than fill space.

*Neurobics* is an engaging group of mental exercises that can be customized for nearly any difficulty level. It's debatable whether there is any mental benefit to playing them, but there is no doubt that these puzzles are di-



verting, engrossing, and challenging.

**List Price:** *Neurobics*, \$44.95.  
**Requires:** 256K RAM, DOS 2.11 or later, Ocean Isle Software, Ocean Isle Sq., #3, Ocean Isle Beach, NC 28459; (919) 579-8728.

CIRCLE 423 ON READER SERVICE CARD

### Life & Death Cuts to the Heart Of the Matter

GAME  
by Robin Raskin

Just thank your lucky ventricles that medical malpractice isn't one of the real-world touches built into *Life & Death* from The Software Toolworks. For here in the corridors of Toolworks

General, as you get a feel (pun intended) for the medical exam and take a stab (also intended) at the rigors of the operating table, your efforts will inevitably end up adding to the population of the hospital morgue.

The patient's room is the scene of a strange examination. Click your mouse on the bedridden patient and a bedclothes-draped belly fills the screen. You diagnose by palpating the abdomen until screams and hollers emanate from your patient. Click on the bedside clipboard and you can order a variety of treatments. The wrong diagnosis sends you shamefacedly back to medical school, where a smarmy Dr. Lindstrom let's you know where you goofed.

*Life & Death* takes a turn for the zany once you make the decision to operate. You scrub, sanitize, anesthetize, administer

the prep drugs and fluids, and you're off. Soon, you'll find it's second nature to use your hand-shaped icon to pick up instruments that retract subcutaneous muscle tissue or plug up a messy bleeder.

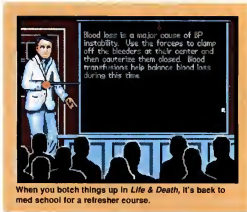
Sprinklings of realism dot the game. Your beeper goes off and you must rush to answer it. When the patient's EKG shows a PVC (premature ventricular contraction) or bradycardia, you've got just seconds to grab the proper drug and inject. The truly driven armchair doctor can advance to encountering more bleeding, more complications, and less help.

With the realism comes a heavy dose of sicko humor. When you lose a patient, your mentor, Dr. Lindstrom, offers one-liners straight out of a B-grade movie, such as "Your patient has joined that eternal choir in the sky."

*Life & Death* offers a whimsical hybrid of realistic simulation and good gore-loving fun. The graphics are superb and the program responsive, although when you work close-up on the operating table the rendering is fairly abstract.

Ultimately, you learn just enough about surgery to be dangerous and just enough about computer games to realize how dangerous they are—and then you save your first patient. Congratulations, Doctor!  
**List Price:** *Life & Death*, \$49.95.  
**Requires:** 512K RAM; CGA, EGA, or VGA adapter; DOS 2.0 or later. The Software Toolworks, 19808 Nordhoff Pl., Chatsworth, CA 91311; (818) 907-6789.

CIRCLE 423 ON READER SERVICE CARD



When you botch things up in *Life & Death*, it's back to med school for a refresher course.

### PC Pugilists Can Slug It Out with Accolade's TKO

GAME  
by Don Trivette

There are several popular boxing simulations for the PC, but *TKO* by Accolade is the only one that offers a first-person perspective. You fight as an unranked challenger vying for

CONTINUES



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## After Hours

### TKO

CONTINUED

the title. To collect the trophy you have to win four preliminary fights and then vanquish the reigning champ. There's also a two-player mode that lets you slug it out with a friend.

Instead of the usual aerial view of two guys pounding it out, *TKO* gives you a split-screen picture of each boxer's face and upper body. You get a glove's-eye view as his leather-covered

number and ends with a display of the round's statistics. What happens in between is up to you. Using the keyboard (OK) or joystick (better) you can guard your head, chin, throat, chest, or stomach—but only one body part at a time.

Matches are not won, however, by attacking, defending. You can throw—and receive—punches in any of nine body parts. Jab your opponent in the right eye, uppercut to his left jaw, and follow through with a hook to the mouth. If that doesn't lay him out cold, try a jab to the solar plexus.

Although ring position is under computer control, you can in-

## Space Quest III: More Fun in Outer Space From Sierra

GAMES

by Alan Cohen

For good or bad, sequels are big these days. Almost every book or movie title seems to end with a II, III, IV, or V. This inevitable milking of a "good thing" can get on one's nerves. Ideas turn stale, plots become tiresome, characters get boring, and you just sit there wishing someone would kindly put the old gang out of its misery.

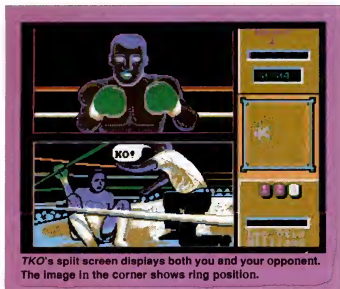
Happily, none of this applies to *Space Quest III—The Pirates of Pestulon*. This latest installment in Sierra On-Line's popular series of animated graphic adventures is, quite simply, the

used your ingenuity (or, more likely, hints from Sierra) to defeat the evil Sludge Vohaul and flee his doomed asteroid base in an escape pod. Now you're just floating around the solar system, not doing much of anything.

But that's about to change. When an automated junk freighter picks up your escape pod, you awaken from hibernation to discover you're trapped aboard the alien ship. Naturally, there's a way out. Once you escape, the real adventure begins.

It seems that Crowe and Murphy, who wrote themselves into the game as the two designers of the legendary (and quite sick) videogame *Astro Chicken*, have been kidnapped by a ruthless, humorless software company. And you—Roger Wilco the do-gooder—are determined to rescue them.

To locate the duo, you must



TKO's split screen displays both you and your opponent. The image in the corner shows ring position.

fist smashes into your nose, and an equally intimate look at your own punches landing on his puffy face. Watch as he bruises and then turns black and blue. There's only one realistic touch missing: as your eyes swell shut, your vision is not impaired.

For title fights the computer randomly selects five opponents from a stable of eight boxers. This gives you a different lineup each time you play. You pick your own man from four unranked hopefuls and set his fighting characteristics, using a sliding scale. You specify his stance (left or right), power hand (left or right), best punch (head or body), strength (speed or power), and weakness (fatigue or cuts). Intelligence is not a factor in this simulation.

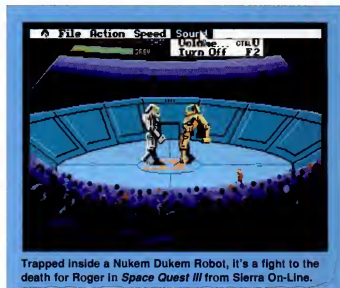
Ding. Ding. Ding. Each round begins with a pretty swimsuit-clad girl holding up the round

fluence it with the direction of your blows. Your opponent reacts as you might expect. Keep hitting him on the right and he'll back away to the left. Drive him to the ropes and your punches will be 25 percent more effective; back him into a corner and your punches will be 50 percent stronger.

*TKO* is not a kinder and gentler game, but then boxing is not a genteel sport. I had great fun mixing it up, and I rank this as a "buy" for boxing fans, but a "pass" for the faint of heart.

**List Price:** *TKO*, \$39.95. **Requires:** 384K RAM, graphics adapter, joysticks (for two players), DOS 2.1 or later. Copy protected and not hard disk installable. Accolade, 550 S. Winchester Blvd., #200, San Jose, CA 95128; (800) 245-7744.

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most original and enjoyable of the entire lot.

*Space Quest III*, like the two previous releases in the series, was designed by Mark Crowe and Scott Murphy—The Two Guys from Andromeda. Warped and deranged, Crowe and Murphy have lost none of the bizarre sense of humor that made their earlier games so offbeat and wacky. Here, in fact, the two designers show themselves to be at a creatively demented peak. We gamers reap the rewards.

The game begins right where *Space Quest II* left off. As Roger Wilco, ace space janitor, you've

solve a number of puzzles, which range in complexity from semi-difficult to downright easy. By no means is this game the intellectual equivalent of such early classic adventures as Infocom's *Zork*, *Deadline*, or *Starcross*. Should you stumble upon a thermal detonator in *Space Quest III*, you take it and don't worry about when or how to use it. When the time comes, you'll know. There are no elaborate riddles to keep you up at night. Everything fits together easily.

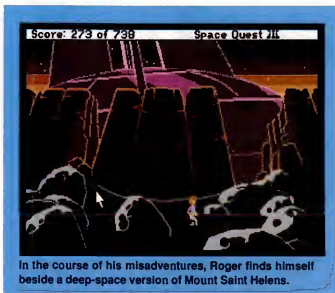
In fact, *Space Quest III* plays more like a movie than an adventure game. The excitement

## After Hours

isn't so much in solving the puzzles as it is in watching the action unfold on the screen. Graphically, this is the strongest and most visually appealing game of the *Space Quest* series. And when it comes to sound... well, there's just no comparison.

### SOUND AND FURY

Like several of the newer Sierra games, such as *Kings Quest IV* and *Leisure Suit Larry II*, *Space Quest III* comes complete with its own original soundtrack. Written by Bob Siebenberg, of Supertramp fame (or infamy, depending upon your taste in music), the soundtrack supports three PC-compatible sound generators. You can use the Ad Lib Music Synthesizer Card, the Roland MT-32 Sound Module, or the IBM PC Music Feature Card. We played the game using both the Ad Lib and Roland synthesizers, and while the Ad Lib sounds great, the Roland is in a league by itself.



A full-featured, 32-voice MIDI synthesizer, the Roland module (which we hooked up to a pair of Yamaha portable speakers) transforms *Space Quest III* into a virtual sight-and-sound spectacular. Percussion noises are particularly impressive—bang into a wall in *Space Quest III* and you'll be convinced someone is trying to break into your

office (presumably to steal the Roland). Many of the game's more bizarre scenes, including a bout between giant metal robots, take full advantage of the synthesizer to produce incredible sound effects. The combination of vivid graphics and exciting, realistic sound makes for a nearly cinematic experience.

Still, at \$550 for the Roland

and \$195 for the Ad Lib (both available from Sierra), incredible sound effects don't come cheap. It probably doesn't make much sense to lay out hundreds of dollars so you can better enjoy a \$59.95 adventure game, but if you already have one of these cards, or if the courts just turned down your bid for Eastern Airlines or Time Inc. and you have some extra cash to burn, you'll definitely want to check out *Space Quest III* in all its auditory glory.

Fortunately, *Space Quest III* is such a good game in its own right that any adventure-loving game player with a good sense of humor will want to check it out. It's got action, it's got excitement, it's got laughs—now if only Hollywood could make sequels like this.

**List Price:** *Space Quest III*—*The Pirates of Pestulon*, \$59.95. **Requires:** 512K RAM; CGA, EGA, MCGA, or VGA graphics; DOS 2.0 or later. Hard disk recommended. Sierra On-Line Inc., P.O. Box 485, Coarsegold, CA 93614; (800) 344-7448.

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